CHILDREN'S TELEVISION WORKSHOP • JUNE 1984 • $1.75

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THE WORLD OF COMPUTERS AND NEW TECHNOLOGY

WIN A ROBOT!
DETAILS, PAGE 46

COMPUTER-AGE ROBOTS
Inside an Amazing Robot Lab!
Plus: Home & Movie Robots

COMPUTERS ROCK MTV

REVIEW: IBM's PCjr

PROGRAMMING: Adam, Apple, Atari, Commodore, IBM, TRS-80, T.I.

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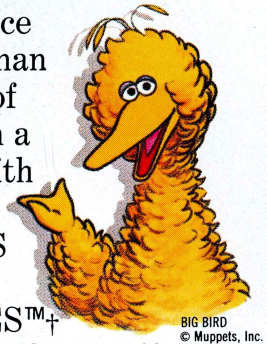

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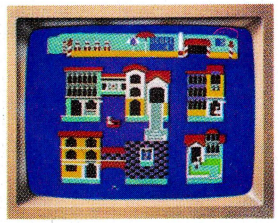

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MENU
JUNE 1984
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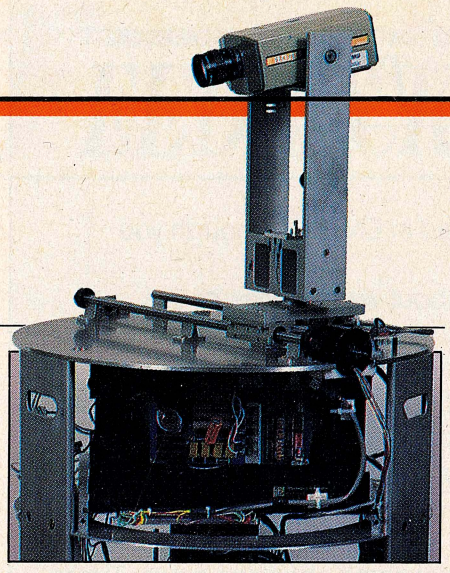
VOLUME 1, NUMBER 8



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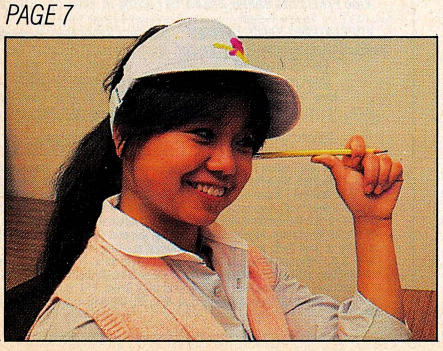

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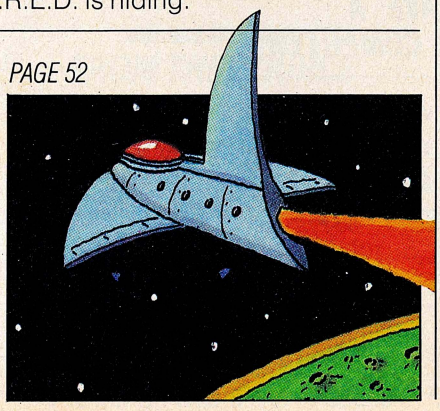

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Cover: Photo © Marty Umans

ON THE COVER: robots by (front) Jerome Hamlin/ComRo, Inc. (back, left to right) Jerome Hamlin/ComRo, Inc.; Clayton Hamlin; Clayton Hamlin. Courtesy of the Robot Exhibit of the American Craft Museum in New York City. T.V. screen: W. Malone.

INSIDE STORY

There's a story you'll never read in ENTER—though you almost did, last month.

The article we're talking about was a review of the Timex/Sinclair 2068 computer. It was written by ENTER tech editor Richard Chevat and Sadie Van Gelder, one of our teenage contributors. After spending a few days working on the 2068, Richie and Sadie wrote a story that said the Timex wasn't for everyone, but that it had a lot to offer computer beginners.

The article was supposed to go into our May issue. It was ready to be sent to our printer when we got some shocking news: Timex was pulling out of the home computer market. They would stop selling computers when their current supply ran out.

Immediately, we pulled the article out of the magazine—after all, no one wants to read a review of something he or she can't buy. Then, we shook our heads in wonder. What happens to all the people who have already bought Timex/Sinclair computers? Like the people who bought T.I. 99/4A or Osborne computers, Timex owners are going to have to scramble to find out about warranties, software availability and the future of their computer.

Amid all this uncertainty, there's one thing we can say for sure: Here at ENTER, you'll see T.I. and Timex programs for a long time to come. We'll also continue to review software for these computers. Helping computer users is what ENTER is all about.

Ira Wolfman

Ira Wolfman
Editor

DO YOU HAVE A DISAPPEARING COMPUTER?

We'd like to hear from readers who own Timex and T.I. home computers. How have you been affected by all this? Have the companies been cooperative? Have user groups helped? Do you have any tips to share with other "disappearing computer" owners? Write us and let us know. Send your letters to: Disappearing Computers, ENTER, 1 Lincoln Plaza, New York, NY 10023.

ENTER™

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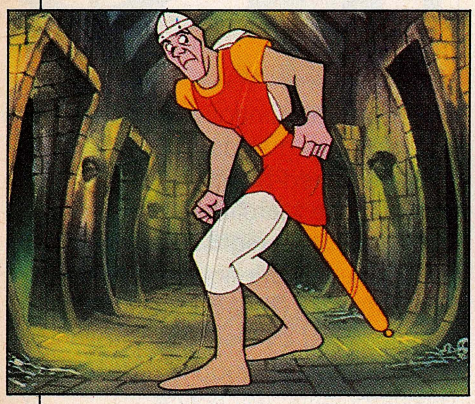
FEEDBACK

SON OF 'DRAGON'S LAIR'?

I'm the biggest *Dragon's Lair* fan. I heard that they were coming out with a *Dragon's Lair II*. Is this true?

—Mike Kavanagh
Woodstock, NY



COURTESY OF DON BLUTH STUDIOS

Dear Mike:

Sure is. Dirk the Daring will be back in full force in Dragon's Lair II: Time Warp. *By now you may have seen our story on it and other laser disc games by Don Bluth in the April '84 issue. Look for the game to appear in arcades some time later this year.* —Ed.

ENTER ON TV??

Since there are *Sesame Street, The Electric Company* and *3-2-1 Contact* magazines—and TV shows for all of them—will there be an ENTER TV show?

—Kevin Cunningham
Philadelphia, PA

Dear Kevin:

We *were wondering that, too. The funny part is the other magazines were born after the TV shows had been on the air for a little while. ENTER is the first Children's Television Workshop magazine not to have a TV show precede it. But that doesn't mean there won't be one. In fact, there's an office at CTW looking into that very possibility. As you might expect, these ventures take time. You can bet, though, that as soon as we know, you will, too.* —Ed.

T. I. UPDATE

I just wanted to thank you for putting my curiosity to rest. I read your article in the March 1984 issue about the disappearing Texas Instruments computer. I was wondering what was going to become of my computer and its software, and your article answered my questions.

—Bill Avonda
Chappaqua, NY

Dear Bill:

We're pleased we could help. You—and other T.I. and Timex/Sinclair owners—should take a look at our "Inside Story." —Ed.

FROM THE SOURCE

On: 01 FEB 1984
AT: 17:44
To: BBI 113
Subject: GREAT JOB, GUYS

I have been receiving your magazine since the beginning. I really enjoy reading your columns, especially "BASIC Training."

One thing I would like to see is reviews on computer games more often.

—Matt Mortenson
Minneapolis, MN

P.S. I found out you were on the SOURCE while reading "Feedback" in your March issue.

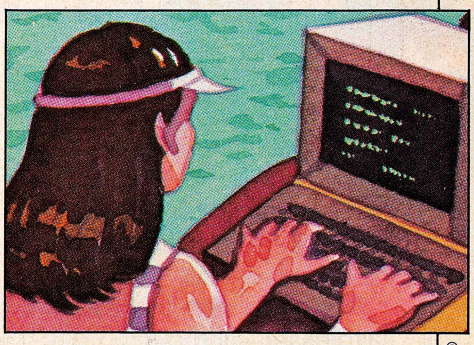
THE POLL TRUTH

I really enjoy my subscription to ENTER, and I think that the reader's poll is an excellent idea. Getting people's reactions to your magazine not only benefits you, but helps readers get "into" the magazine even more.

—Jonathan Oess
Racine, WI

CAMP CONSIDERATION

I really liked your feature about computer camps (March '84). I wasn't planning on going to a



© ELIZABETH KODA-CALLAN

computer camp over the summer, but, after reading your article, I'm definitely going to give it a second thought! Keep up the great work!

—Janet Michelotti
Arlington, VA

(Continued on page 62)

BITS

HIGH-TECH HAIR

Memories, like the color of your hair...The color of your *hair?*

That's right. Hair coloring secrets are now being stored in the memory bank of the Goldwell Coloration Computer. This computer program, imported from Germany, gives hairdressers and clients advice on how to get precisely the color, tint and shading that they want. The system, which can give advice on 64,000 formulas for changing hair color, "does not replace the knowledge of the hairdresser," says Rick Harrington, who uses the computer at his Boston beauty shop. "But it does take the guesswork out."

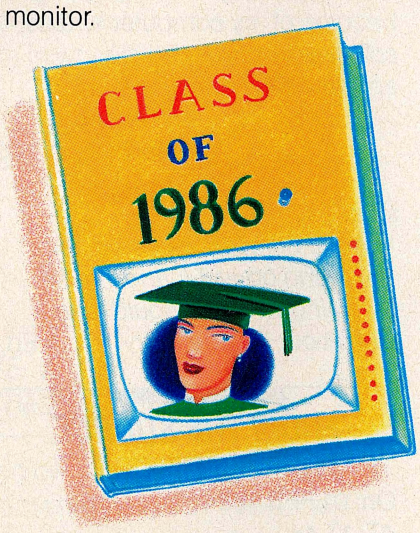
Stop guessing. Only our hairdresser—and our computer—know for sure.

TV GRADUATION

Twenty years from now, Chicago area high school alumni will look fondly back on the days of arcade antics, punk rock proms and computer classroom capers. But they may not be pulling out the old hardcover yearbook. Instead, they could be dusting off the VCR and plugging in their "Video Yearbook."

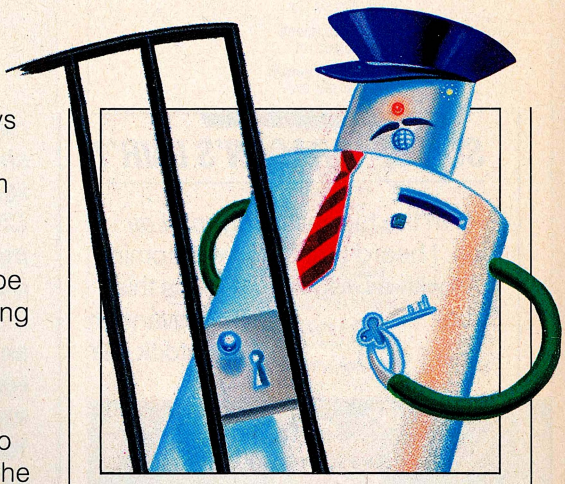
Class rings, pom poms and pennants are still around, but Dennis Petrick, founder of Video Yearbook, Inc., is counting on the departure of the old-fashioned book format. His *Yearbook* comes on a TV-type cassette. You can tailor it to feature *you, your* friends and *your* activities.

So far, *Video Yearbook* is only available in Chicago. And there's one other problem: no one has figured out how to get people to sign their picture on the TV monitor.



SENTENCE STRUCTURE

People are always talking about inventive uses for robots. Here's a futuristic use that's no longer just talk: imagine a prison with robots as guards.



Four-hundred-pound robots may soon be patrolling prison corridors during night shifts, the least popular work hours for prison guards. The robots, manufactured by Denning Mobile Robotics Inc., of Woburn, Massachusetts, will notice inmates by sound, shape, motion and smell. The four-feet-tall mechanical watchmen will blare out the warning, "You have been detected!" And they will never let down their guard.

BYTING CRIME

Everybody knows you can't judge a book by its cover, but how about a pair of pants by its label? Billions of dollars of counterfeit records, jeans, tapes, computers, and more, are sold each year to customers who think they're buying brand-name products. How can you be sure those hot new jeans you're sporting are by authentic designers and not *really* "hot" (counterfeit)?

The computer can help. A new

ILLUSTRATIONS © DAVE CALVER

system, developed by Light Signatures, Inc., individually "fingerprints" products. It uses a high-intensity light beam and a computer to imprint a one-of-a-kind invisible digital code on the item's label. The high-tech system can imprint 100,000 labels per hour. Like a fingerprint, no two imprints are exactly alike.

The computer keeps a record of all imprinted labels. If manufacturers suspect a store of selling counterfeits, they can buy samples of the product and test for authenticity. Levi Strauss and Chrysalis Records are currently using The Light Signatures system.

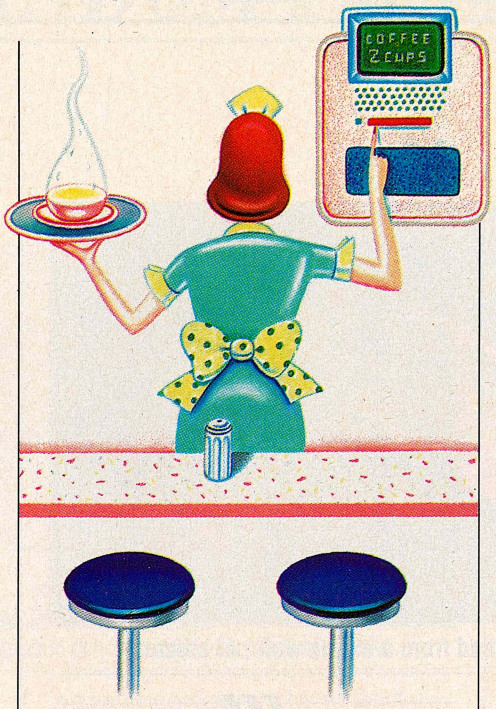
When it comes to separating the fine from the fake, computers accept no substitutes.

COMPUTER-RATED GRADS?

If you were trying to get into college, would you want a computer to judge your "acceptability"?

Richard Moll, dean of admissions at The University of California at Santa Cruz, would. His software program *FAIR* (Force to Adjust Inadequate Requirements) computes a point system for prospective Santa Cruz students. It averages high school grades and national test scores, and adds bonus points for less objective information like "quality of high school" and teacher's recommendations.

Some admissions officers are skeptical about FAIR's fairness. They think humans should decide who gets into college, and "high score" ratings should be left to arcade games.



DIGITAL DINERS

Short-order cooks and short-tempered waiters, beware! You may soon get the runaround from a machine that really cooks: the computer.

Restaurants like Anthony's Pier 4 in Boston and The American Cafe in Washington, D.C., have "hired" The Expediter, a computer system that shortens the time it takes to get food from kitchen to customer. Once the waiter takes the order, it's entered into the computer. The cook reads the monitor, then types in "ready" when all's prepared. The waiter checks the computer, then runs back into the kitchen to pick up the order.

The Expediter also logs the order with the cashier for speedier check totalling later.

Frankly, we'll miss hearing the waiter call out for "a burger on the hoof" next time we order a rare hamburger.

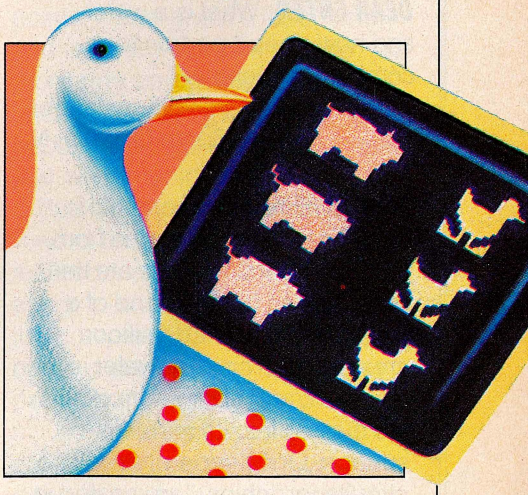
FARM-LINE

Old McDonald had a farm, E-I-E-I-O-O-O-O. And on the farm he had a....what? A computer?

You got it. You'll find these electronic pets in the barn alongside the cows and chickens on an increasing number of farms. And thanks to a new videotex service, there will be even more bits and bytes at the farmer's market.

Grassroots California, currently being developed by Videotex America and McClatchy Newspapers, will provide valuable data to on-line farmers who subscribe to the service. The farmers will receive up-to-the-minute weather information, the latest feeding and fertilizing developments, stock market trends and livestock data.

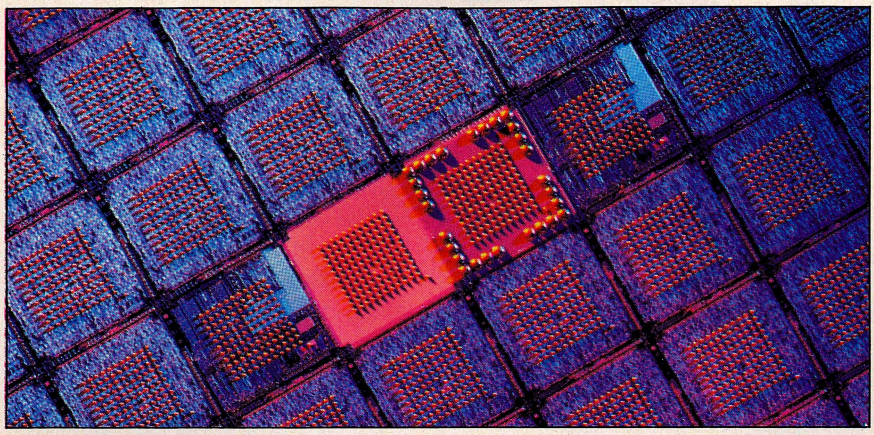
So next time you visit the old farm, listen carefully. Beside the



moos, squawks and baaahs, you may notice the faint hummm of the barnyard micro.

We want BITS! If we use your news, you get an ENTER t-shirt. Send news items to: "Bits Editor," ENTER, 1 Lincoln Plaza, N.Y., N.Y. 10023

ASK ENTER



Dozens of microchips can be etched from a single wafer of silicon.

BY DAVID B. POWELL

WHAT IS A WAFER?

DEAR ENTER: What is a wafer and how does it pertain to a computer's memory?

—Elana Jacobs,
South Orange, NJ

DEAR ELANA: All silicon chips found in computers come from silicon "wafers." Wafers are thin disks sawed from the end of a very pure, man-made silicon crystal. Each circular wafer is then polished, and computer circuits are etched into its mirror-like surface. Once separated, these circuits, or "chips," are sealed in protective casings. (For an illustrated description of this process, see ENTER's first issue, October 1983, pages 46–50.)

The word "wafer" has also been used to describe a special type of tape storage device. These devices, also called "wafers," are very small tape cassettes.

SOFTWARE MARKET GUIDES

DEAR ENTER: Can you tell me where I can get a book telling about companies that might buy my programs? —Joey Mueller, Rockport, MA

DEAR JOEY: There are several books out that list companies in the market for original computer games or education software. The *1984 Programmer's Market* from Writer's Digest Books is one of the best. It's new this year and contains more than 500 listings of software publishers, game manufacturers and magazines that buy freelance software. In it, the buyers themselves tell what they buy, how much they pay and how to submit software. The book also includes information on how best to submit programs to buyers. It lists for $16.95.

Another book that's helpful and authoritative is *Software Author's Guide*, which is published by Datamost. It's written by Mildred A. Heiney, costs $19.95 and should be available in bookstores.

A word of caution: don't expect to strike it rich with your first (or 15th) program. The software market is very shaky right now and the competition is tough.

SPACE INVADERS WRIST?

DEAR ENTER: I would like to know if controlling a joystick for a long time does harm to your muscles or bones. —Kim Bradburn, Kempner, TX

DEAR KIM: Anything you do that puts a strain on your muscles and joints could cause problems. That's especially true while you are young and still growing. Because of this, some people have been concerned about kids' playing video games for hours.

According to Joe Elia of the *New England Journal of Medicine*, doctors have labeled a specific type of muscle strain "Space Invaders Wrist." The main symptom is a wrist that is stiff and slightly painful—especially in cold weather.

The condition isn't very serious—just stop playing for a while and it goes away. But if it continues more than a day or two, you might want to consult your doctor.

DAVID B. POWELL is an ENTER contributing editor.

If you have a question about computers, write: Ask ENTER, ENTER Magazine, CTW, 1 Lincoln Pl., NY, NY 10023.

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RANDOM ACCESS

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Just imagine: at 18, I was a computer pro in a company full of adults.

EXPERT IN AN INSTANT

BY ELMA LEONARDO

My summer job last year was a little strange. I, who knew only a bit about computers, was hired to teach an entire office of accountants how to use their computer.

I got the job through my high school teacher's recommendation, and I have to admit that I was pretty nervous about it. But, as my teacher reassured me, "If you ever think that you don't know anything about programming, just remember: they know even less."

The firm I worked for, a New York City diamond company, had bought a computer over a year before I got there. They were planning to do all their bookkeeping on it. But the accounting software they had bought was complicated—and no one in the company had the time or knowledge of computers to figure it out.

That's where I came in. I think they hired me because they were desperate for *someone* to learn the computer system. So all summer, the staff kept the company's records in the traditional way. Then, as I learned the program, I was to teach the staff how to use it.

My first day did nothing to bolster my confidence. I didn't know anybody and didn't know what I was supposed to be doing. Everyone expected me to know the program and be able to answer their questions. The only thing *I* knew that *they* didn't was how to load the program properly.

For the next four months, I was an explorer; my mission was to learn the accounting program. I sat in front of the Commodore PET for eight hours a day and experimented, plugging in values and figuring out what the program was doing to them.

Sometimes my experiments ended in total frustration. I'd lose tons of data or foul up the entire system. Once, I spent about three days typing in a list of names, addresses and billing information. When I finished, I typed in the wrong commands. In a split second, I lost everything.

On days like that, I felt like throwing the program out the window. My boss was very patient when I made mistakes. But it was hard for me to be patient—especially since it meant starting *all* over. But after some struggle, I became the company "expert" on that program. Whenever anyone had a question about how it worked, he or she would come to me.

The job had its good and bad points. I was given a lot of time and freedom to figure out the program's capabilities. But every once in a while, the staff expected too much from me—and that was intimidating.

But, mostly I liked the job. Toward the end of summer, I realized just how much I had accomplished. When I finally left the company, the program was printing out monthly statements perfectly. I felt really great when my boss pulled me aside to compliment me on the work I'd done. It made even the worst days seem worthwhile.

ELMA LEONARDO, 18 years old, attends S.U.N.Y. Stony Brook.

What do you have to say about computers? Write a short note to: Random Access, ENTER, 1 Lincoln Plaza, N.Y., N.Y. 10023.

USER VIEWS

HOP TO IT

BY PHIL WISWELL AND BERNIE DEKOVEN

In the beginning came *Space Invaders*, and it was good. So good, in fact, that it spawned dozens of games very much like it. *Asteroids* did the same, and so did *Defender* and *Pac-Man*.

At present, we are living through the age of *Q*Bert* and other hopping games. The games reviewed this month all contain a central character who hops around. These games are about organization, neatness, and the tying up of loose ends. Some are good spin-offs and some are bad rip-offs. Here's a look before you leap.

Q*BERT

(Parker, ColecoVision, $30–$40)

*Q*Bert* is the original. It is a simple, but wonderfully engaging, game. The entire playfield consists of only 28 spaces on a stack of cubes. *Q*Bert* changes a cube's color by hopping on it. The object is to change the colors of all 28 cubes.

There are other characters: Red and purple balls appear at random and attempt to smash into Q*Bert. Purple balls change into Coily snakes, then track *Q*Bert* down.

In later rounds, Uggs appear. But Slick is the meanest enemy. The cubes Slick leaps on turn

back to their original colors. You do have one friend: the green ball. Catch it and you freeze your enemies.

The four rounds of play in the first level of *Q*Bert* are identical, though each is a bit more difficult than the previous one.

WRAP-UP

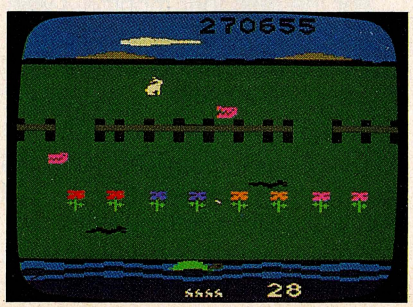
BERNIE: This is a wonderful translation of the arcade game. It has depth and strategic involvement. Control, however, is not too good.

PHIL: But that's true of all these games. The home joysticks just weren't made to control diagonal hopping games.

RABBIT TRANSIT

(Starpath, VCS cassette, for use with Super-Charger, $15)

Rabbit Transit is played on two separate screens and includes a



cartoon bonus.

On screen one, your rabbit begins near the top, and must hop through picket fences and flowers. You must also be careful to avoid crawling snakes and flying insects. Screen two consists of 31 platforms arranged so you must hop diagonally from one to another. Successfully complete this second board and you get to watch a cartoon of your rabbit hopping through a meadow scene.

WRAP-UP

PHIL: The graphics on all three screens are better than average.

BERNIE: Younger players might love this one. Just don't expect the strategic depth of *Q*Bert*.

BOING!

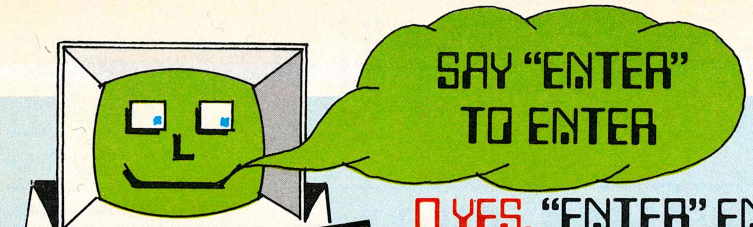
(First Star Software, VCS, $21.95)

In *Boing!*, your character is a bubble that must hop onto 36 different platforms arranged as a parallelogram. *Boing!* is obviously a lot like *Q*Bert*, but it contains only two other game characters. One is a pin that hops down a column; the other is a bubble eater that lies dormant, then begins to chase you around. There are no disks to transport you around, as there are in *Q*Bert*. You must either outrun the bubble eater or lead it into the path of the pin.

Like *Q*Bert*, *Boing!* has six levels of play. But each level has five, not four, rounds to complete.

WRAP-UP

BERNIE: The animation of the characters and the color



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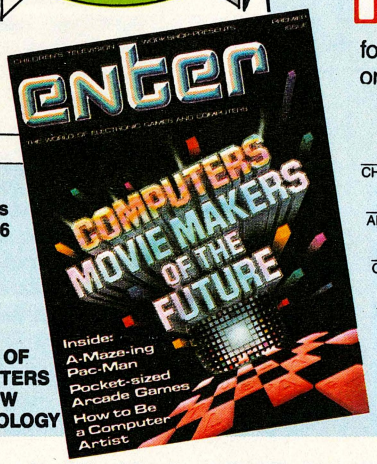

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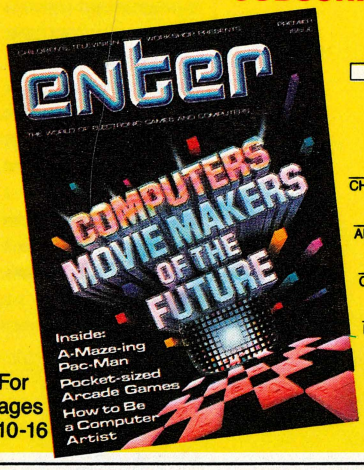

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FROSTBITE

(Activision, VCS, $34.95)

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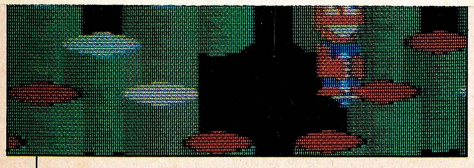
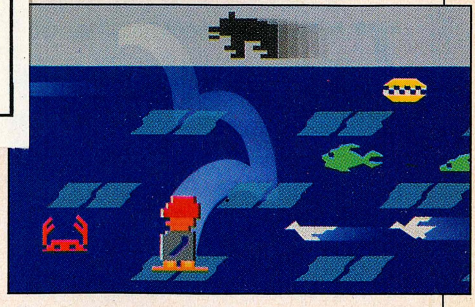
Unfortunately, there are only two





Your character, Pogo Joe, leaps from one cylinder to another via pogo stick. *Pogo Joe* has a unique feature—the double jump. Leaping over two cylinders is the only way your character can outwit the grotesque—but gorgeously drawn—creatures that chase it around.

the monkey. And, oh yes, be alert for "sticky squares" that will freeze you temporarily.

You're fighting against time in *Flip & Flop*. You have to clear 36 boards and you only have a limited time to do this. Those "sticky squares" can foil the best game plan. Just when you think you're about to beat the clock and clear the board, you get stuck.

A clever touch!

WRAP-UP

PHIL: I think my favorite part of this game, other than the neat boards that increase difficulty by increasing the speed of the creatures. We yearned for more.

WRAP-UP

BERNIE: It would have been nice if you had to carry each ice block as you got it, and build the igloo yourself.

(Continued on page 60)

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HOP TO IT

BY PHIL WISWELL AND BERNIE DEKOVEN

In the beginning came *Space Invaders*, and it was good. So good, in fact, that it spawned dozens of games very much like *Asteroids* did the same, and so did *Defender* and *Pac-Man*.

At present, we are living throug the age of *Q*Bert* and other hopping games. The games reviewed this month all contain a central character who hops around. These games are about organization, neatness, and the tying up of loose ends. Some are good spin-offs and some are bac rip-offs. Here's a look before you leap.

Q*BERT

(Parker, ColecoVision, $30–$40)

*Q*Bert* is the original. It is a simple, but wonderfully engagin game. The entire playfield consists of only 28 spaces on a stack of cubes. *Q*Bert* changes a cube's color by hopping on it. The object is to change the colors of all 28 cubes.

There are other characters: Red and purple balls appear at random and attempt to smash into Q*Bert. Purple balls change into Coily snakes, then track *Q*Bert* down.

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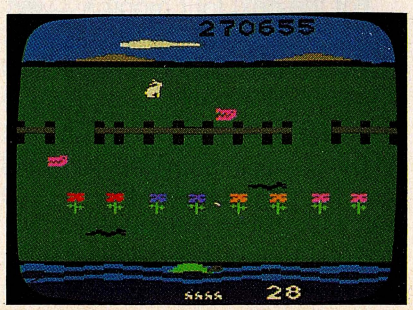
Super-Charger, $15)

Rabbit Transit is played on two separate screens and includes a



only two other game characters. One is a pin that hops down a column; the other is a bubble eater that lies dormant, then begins to chase you around. There are no disks to transport you around, as there are in *Q*Bert*. You must either outrun the bubble eater or lead it into the path of the pin.

Like *Q*Bert*, *Boing!* has six levels of play. But each level has five, not four, rounds to complete.

WRAP-UP

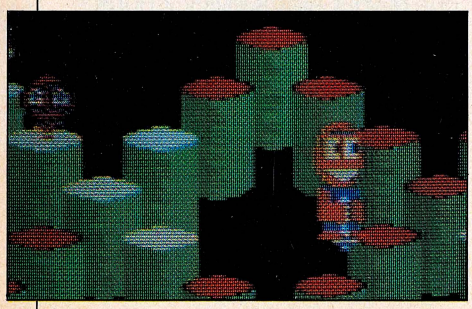
BERNIE: The animation of the characters and the color

combinations are not very good.
PHIL: *Boing!* has one advantage over *Q*Bert*. The bubble can move really fast. With better graphics, I think we'd have liked this game. But, as it is I would take *Q*Bert* over *Boing!*.

POGO JOE

(Screenplay, Commodore 64 disk and cassette, $24.95)

Each of the 64 screens in *Pogo Joe* presents a different arrangement of cylindrical columns. It gives the game a nice three-dimensional quality. The object is to change the color on the top of each cylinder.



Your character, Pogo Joe, leaps from one cylinder to another via pogo stick. *Pogo Joe* has a unique feature—the double jump. Leaping over two cylinders is the only way your character can outwit the grotesque—but gorgeously drawn—creatures that chase it around.

WRAP-UP

PHIL: In some screens, the cylinders disappear as you leap, which means you can leap right into a corner! I wish the entire game had this feature.
BERNIE: The bonus rounds are best, but *Pogo Joe* is still enjoyable overall.

FLIP & FLOP

(First Star Software, disk for Atari computers and Commodore 64, $29.95)

Flip & Flop makes you hop (of course), but this game gives you two characters—a kangaroo and a monkey—to do the job. The graphics are excellent.

When you complete a board, something strange and beautiful occurs: the maze flips upside down and the player now controls the monkey. And, oh yes, be alert for "sticky squares" that will freeze you temporarily.

You're fighting against time in *Flip & Flop*. You have to clear 36 boards and you only have a limited time to do this. Those "sticky squares" can foil the best game plan. Just when you think you're about to beat the clock and clear the board, you get stuck.

A clever touch!

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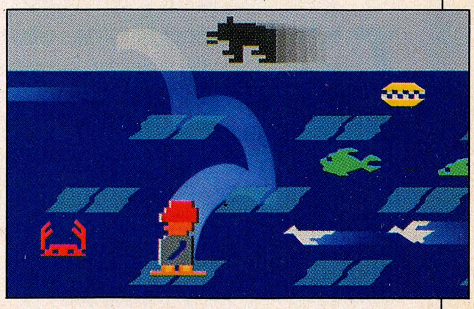
BERNIE: My only problem was with control over the character.
PHIL: That seems to be a problem with all home hopping games.

FROSTBITE

(Activision, VCS, $34.95)

We found the *idea* behind *Frostbite* a lot more interesting than the game itself. As Frostbite Bailey, you stand on solid ground at the top of the screen. Below, rows of ice blocks move in different directions. You must continue leaping from one row to another in order to build an igloo. For each successful jump, a block is added to your icy dwelling. You must be careful not to leap into the water or be knocked in by any of the arctic creatures. The object of each round is to build the igloo, then get inside it before the temperature reaches zero degrees.

Unfortunately, there are only two



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WRAP-UP

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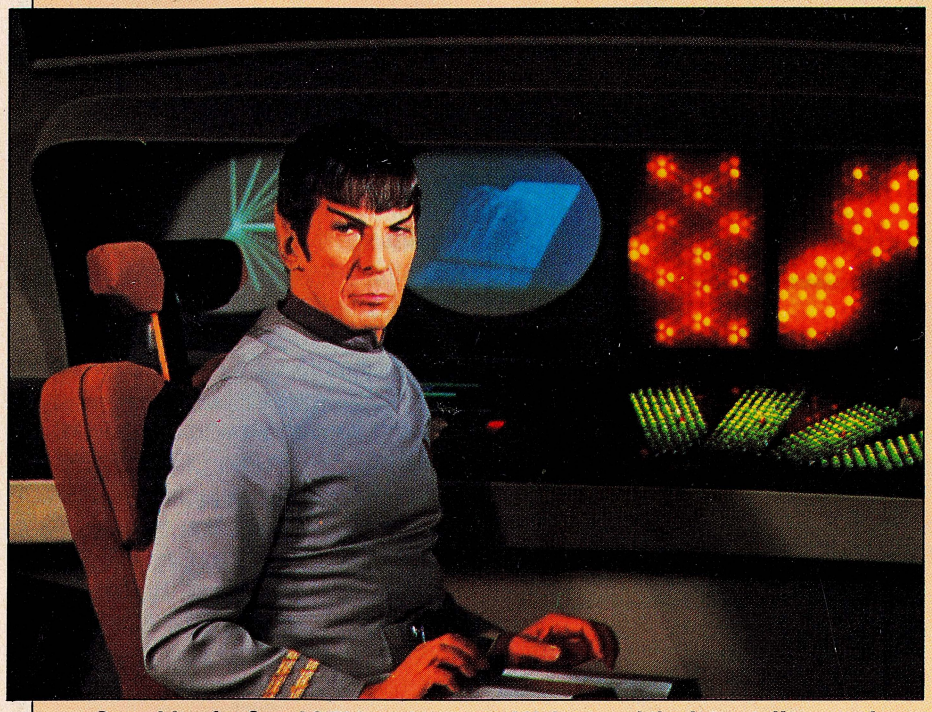
(Continued on page 60)

NEWS BEAT

NEW SOFTWARE LAUNCHED



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Searching for Spock? This pointy-eared Vulcan and the interstellar arcade hit, *Star Wars*, will beam down to Earth in new home games.

The software industry has discovered a new frontier: outer space. Many of the most eagerly awaited games of summer 1984 take place in galaxies far, far away.

Whether you're searching for Spock, looking for Luke, or just fond of space adventures, you'll find prepackaged programs to help you in your quest. Here's an update on the software space race:

Parker Brothers has brought the hugely popular *Star Wars* arcade game to the home, adding the program to their other spacey games, *The Empire Strikes Back, Jedi Arena, Return of the Jedi,* and *Death Star Battle.* "The game captures the exciting graphics and gripping fast action of the arcade game," Parker Brothers' Dick Petti says. "It puts you in the driver's seat." The home version is available for Atari, Coleco, and Commodore 64 computers. So even if there's no new *Star Wars* movie this summer, the Force *will* be with you.

Star Trek's pointy-eared Mr. Spock is also moving from big to small screen. A *Search for Spock* game is due out from Sega Software, timed to coincide with the release of the movie early next month. At the same time, Spock's alter-ego (actor *Leonard Nimoy*) has signed on as the earthly representative of HESware.

With all of that, there's still more unworldly news. The publishing house of Simon and Schuster has introduced a new line of science fiction software. The new series is called Baen Software and includes two "survival in outer space games," *Wings Out of Shadow* and *Berserker Raids.* They're available for Apple. IBM and Atari versions are due out soon.

ATARI LAB: Atari recently introduced a new series of products that lets you become a scientific whiz. It's called *Atari Lab,* and you use it with most Atari computers to perform and record a wide variety of science experiments.

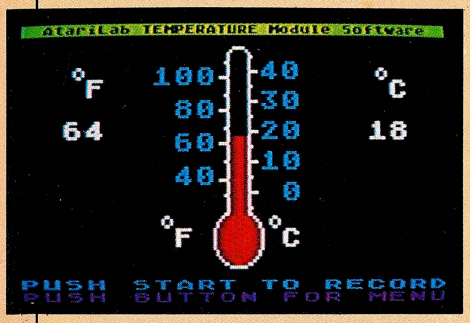
The introductory Atari Lab package consists of (1) an interface board which you plug into one of your Atari's joystick ports, (2) an electronic thermometer that Atari calls a "sensor" and (3) a software cartridge. There's also a book which details several experiments you can perform.

With the introductory module, you can explore everything from the nature of temperature to energy release in chemical reactions. You can add on other modules later, because the interface is adaptable.

You can build new sensors yourself, or buy them in other *Atari Lab* modules. Each module will focus on a different science topic, and come with its own sensors and software cartridge. A light

sensor kit is already available, and others will appear later this year.

The Atari Lab starter set retails



***Atari Lab:* experimental software.**

for $79.95. Each additional module will cost $49.95.

SOFTWARE SOIREE: It was the first of its kind—a convention devoted entirely to software. Organized by 21-year-old Boston Biz Kid Jonathan Rotenberg (see ENTER's April, 1984, issue), "Softcon" attracted more than 20,000 software spectators to the New Orleans Superdome. While not much new material was introduced, some packages seemed noteworthy. Here are some highlights of the three-day computer conclave:

PREHISTORIC ADVENTURES: CBS Software announced a new line of science learning games. The first in a series from CBS and Keron Software is *T Rex,* a survival game featuring you as a dinosaur. Can you survive the obstacles that knocked off those gigantic lizards? Or can you help the bees in Keron's second game, *The Honey Factory?* CBS says you'll learn a load about natural history as you try....

Tronix introduced a slew of new games at Softcon, including *Suicide Strike* (which features a rear-view mirror effect), *Waterline,* a game where you start out in a sinking ship, and *Motorcross,* a speedy motorcycle program....

Dynatech's new *Adventure Writer* lets you write your own computer adventures. You control locations, treasures, hazards and other variables. It's one way to win a game!...Who says girls can't hack the hazards of dangerous tropical adventures? They can! At least they can in the *Rhiannon* series from Addison-Wesley. These four games were designed for beginning girls to play. The series includes *Chelsea of the South Sea Islands, Lauren of the 25th Century, Cave Girl Clair,* and *Jenny of the Prairie....*Entertainment surprise of Softcon was programmer *Tom Snyder.* Tom is famed as the designer of *Snooper Troops* and *In Search of the Most Amazing Thing.* But when Tom takes a break from *programming* computers, he starts *singing* about them. At a party sponsored by Scarborough Systems, Tom and his own home-grown band sang some original Snyder songs—including "Dr. Micro," "Flipped Out of Control," and "Run For The Money" (The name of his new Scarborough game). What will he do for a follow-up? Record "Boogie till it Boots," maybe?

THREE-PART HARMONY: Come sing along, play along, and whatever along with *Musicalc 1, 2,* and *3* from Waveform. The three programs work together to help you create your own symphonies.

MusiCalc 1 ($49.95) is a software package that uses the Commodore 64 as a musical instrument that has a three-voice synthesizer, slider controls, sequencing, modulators and transposers. *MusiCalc 2:Score-Writer* ($34.95) works with *MusiCalc 1* and translates music into standard musical notation. *MusiCalc 3* ($34.95) adds over 70 musical compositions to the package.

And you don't have to boot up *MusiCalc* to get a picture. "We've produced the first picture disk," boasts a company spokesman about *MusiCalc 1, 2,* and *3,* which comes in three colors and features pictures of musical

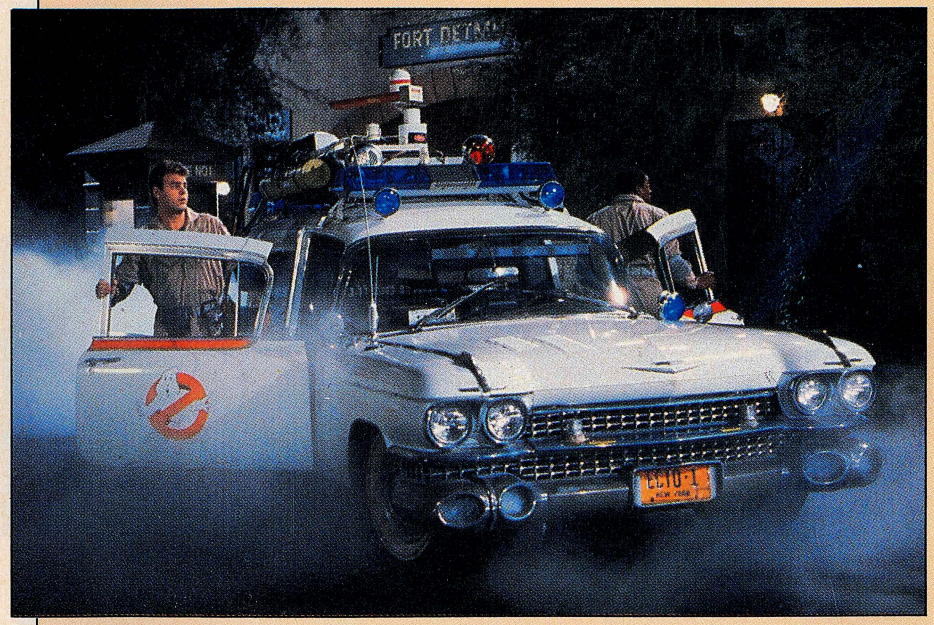
***MusiCalc:* Sights and Sounds**

instruments *on* the floppy. "In two years, I don't think anyone will have a black disk."

HARDWARE BITS:....The PCjr had barely made an appearance when *IBM* introduced another new computer. This one is *a portable version* of the PC. It will be priced lower than the popular IBM compatible, *Compaq*...Even though Timex-Sinclair has left the home computer market, the company that designed their computers, the *Sinclair Corp. of Great Britain,* is doing quite nicely, thank you. They've introduced a new computer called the *QL,* which is supposed to be more powerful than the Macintosh and will retail for only $575. But it's only available in Great Britain, and they have no plans right now to market it in the U.S.

SHOW BEAT

LASERS' GHOSTLY LIGHT



COURTESY OF COLUMBIA PICTURES

Actors Dan Aykroyd (left) and Ernie Hudson match wits with spooky special effects in *Ghostbusters*.

What does New York have that no other city in America has? Apparitions! That's right—*ghosts*. And the only way the Big Apple can rid itself of these dangerous demons is with the help of a team of kooky parapsychologists.

These phantom-chasers are the stars of Columbia Pictures' new film, ***Ghostbusters,*** due out June 8 at theaters across the U.S. *Ghostbusters* combines the comedy antics of funnymen Dan Aykroyd and Bill Murray with special effects that will have you believing in ghosts before your popcorn runs out. And, naturally, computers played a role in the creation of those effects.

If you're a special effects fan, you probably remember the fast-swirling cloud formations looming over the treasure in ***Raiders of the Lost Ark,*** and the terrifying ghouls in ***Poltergeist.*** Gary Platek, formerly of Lucasfilms, was one of the technicians who created those effects. Gary, who now works for Boss Films, Inc., was called on again to help craft *Ghostbusters'* special-effect spooks.

Lasers are Gary's real specialty. In *Ghostbusters,* he combined the laser's power with the precision of an Apple computer to make the moving figures you'll see as phantoms in the film.

First, Gary created ghostly shapes on the Apple monitor with a Gibson light pen. Then an argon laser beam, whose shape was controlled by a computer, was shot into a fog generator, highlighting portions of the fog. A camera crew filmed the process.

Finally, various film steps combined the free-floating fog and the previously generated shapes. In a process something like animation, Gary ran a series of images together, changing the size, path and speed of each image with the computer. The result? Moving, ghost-like figures that will haunt movie-goers.

Working with lasers and fog generators is "actually quite easy to do," he says, adding, "And it's certainly much easier and faster than having someone create the graphics on a computer."

With effects like these, *Ghostbusters* is bound to be a howling success — pardon the expression — from ghost-to-ghost.

—Patricia Berry

COMIC STRIP HACKER: Cartoonist **Berke Breathed,** 26, once said he'd *never* put anything about computers in his syndicated comic strip, ***Bloom County.*** Computers, he explained, were just too boring. But not long after Berke made that statement, a bunch of hackers from Milwaukee, now known as the 414s, were discovered breaking into high-security computer centers around the country.

That event led to a change of heart on the part of this computer-phobe comic writer. "The mischief angle" was too good to pass up, Berke decided. And so, the *Bloom County* strip got a new

character: hacker Oliver Wendell Jones. Oliver is a precocious kid with one thing on his mind: infiltrating top-secret files with his computer.

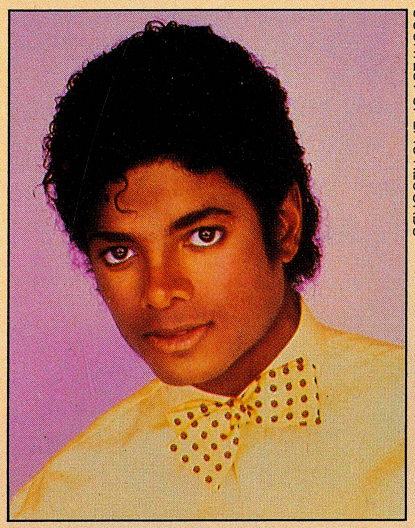
Oliver made his first appearance in *Bloom County* in the fall of 1983, and has popped up every so often in the months since. So far, there's been no negative response from readers to Berke's humorous look at Oliver's misdeeds. Breathed does, however, get an occasional letter from parents of hackers. In fact, one mom claimed she was *positive* that Berke had modeled his character after her son. As proof, she sent in a picture of her son at his computer, wearing the same thick glasses Oliver wears.

And, of course, there are the not-too-rare phone calls from real hackers who want to chat — but ask Berke not to give their numbers to the F.B.I.

Before long, Berke plans to expand the Oliver character "to reflect my interest in science with whatever humor can be found there."

For now, Oliver and *Bloom County* are reaching 500 newspapers around the country.

MOVIE BIT: There's bound to be pan-demonium at theaters everywhere if the rumor is true that high-tech movie-maker **Steven Spielberg *(E.T.)*** and superstar **Michael Jackson** are teaming up to re-make the fantasy film classic



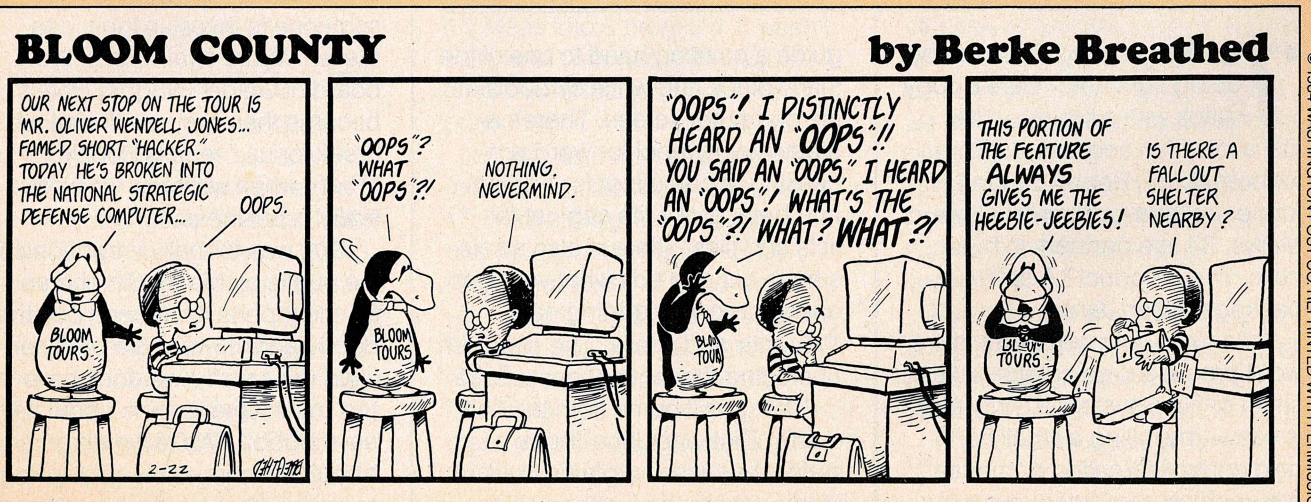
COURTESY OF EPIC RECORDS

Michael will dance on air if *Peter Pan* movie takes off.

Peter Pan. There's lots of talk, but no solid news yet on filming and release dates. Even if it's a 100% sure thing, the filming will have to wait a while, however. Michael's calendar is pretty full these days. Between a summer concert tour with his brothers, and another record due out some time next year, there doesn't seem to be much room for flights of fancy. But most of Hollywood is hoping this thriller will pan out.

SILICON SOAP: Combine TV's ***Whiz Kids*** with prime time soap opera ***Dallas*** and what do you get? Warner brothers and ABC-TV call it ***Midas Valley,*** a soap that may bring a Silicon Valley-like setting into homes across America next fall. Reaction to the two-hour pilot for the show — to be aired this spring — will determine whether *Midas Valley* makes ABC's September line-up of new shows.

You can probably guess the plot: industrial espionage at a powerful computer conglomerate. We can just imagine the leading characters. How about a hero who's married to the sister of a crazed hacker? Or maybe a sultry computer programmer who's suspected of aiding Soviet spies? And, why not a touch of what every soap opera needs — a walking, talking robot with big antennae, x-ray vision and no particular allegiance? Maybe that'll be in the sequel.


BLOOM COUNTY
by Berke Breathed
OUR NEXT STOP ON THE TOUR IS MR. OLIVER WENDELL JONES... FAMED SHORT "HACKER." TODAY HE'S BROKEN INTO THE NATIONAL STRATEGIC DEFENSE COMPUTER...
OOPS.
BLOOM TOURS
Z-ZZ
"OOPS"? WHAT "OOPS"?!
NOTHING. NEVERMIND.
"OOPS"! I DISTINCTLY HEARD AN "OOPS"!! YOU SAID AN "OOPS," I HEARD AN "OOPS"! WHAT'S THE "OOPS"?! WHAT? WHAT?!
THIS PORTION OF THE FEATURE ALWAYS GIVES ME THE HEEBIE-JEEBIES!
IS THERE A FALLOUT SHELTER NEARBY?

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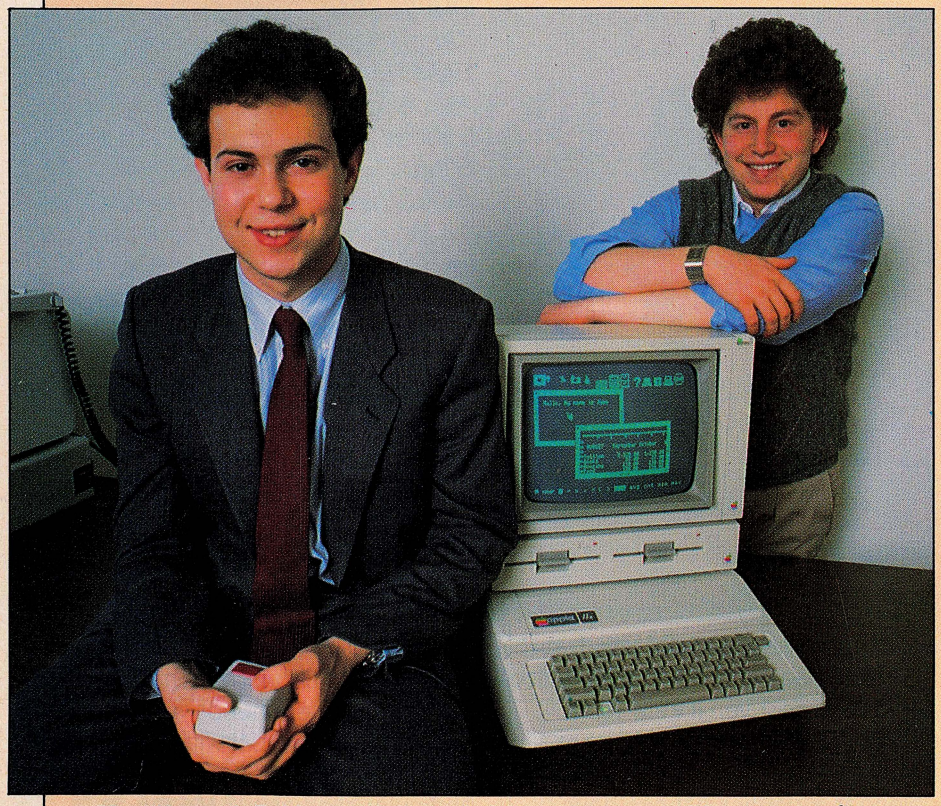
PACESETTERS

THE BOYS BEHIND 'JANE'



© PETER YATES

Meet Howard, Bobby...and *Jane*, their easy-to-use, multi-purpose software package that made its debut this spring.

"There's nothing I'd rather be doing right now," says Bobby Kotick with a big grin. "It's just a lot of fun and *very* exciting for both of us." Bobby, 21, and his former college roommate, Howard Marks, 20, are partners in business. Their product? A software package called *Jane*.

Jane turns your computer into a word processor, calculator, spread sheet or filing system. Using *Jane* is easy—by rolling a small hand-held controller (called a "mouse") or punching computer keys, you guide a pointing hand to one of the many black and white symbols on the computer screen. There's a typewriter symbol for word processing, a calculator for adding numbers, and a file cabinet for lists and files. There is also a scissors to cut and edit what you write, and an arrow for adding new thoughts and ideas. The program (including the mouse) costs $295.

Jane gets it name from the children's "Dick and Jane" book series, because, explains Howard Marks, "that's the first book kids read, and *Jane* is a program you should start with. The difference between the two is that you grow with the program rather than outgrow it."

The idea for *Jane* was born three years ago. Howard, the hacker of the two, took his first computer course in college and really enjoyed it. "None of my friends had any idea what computers could do. I kept thinking 'There should be some way to make using computers so simple that everybody could use them.' That's when I began to think about *Jane*.

"In the beginning I did all the work on paper," Howard remembers. "I designed everything. But then I realized that if we were going to do it right, we needed to hire some programmers to help out. So I hired one or two people. Before we knew it, there were 12 programmers working for us. I was very careful to stick to my original idea, though, and keep it very, very simple to use."

With a little bit of luck, Bobby and Howard were able to find someone to invest in their idea. Steven Wynn, chairman of the board of Golden Nugget Hotels, became their partner. "It was a big break for us," recalls Bobby. "That's when we knew we were really in business."

Jane was formally introduced to the public on March 8th and so far, the reports have been positive. Bobby and Howard are pretty excited. "But really, we don't have too much time to think about it," says Bobby. "We're working about 16 hours a day, plus going to school."

Portable Programmer

Jason Rich, 17, writes and sells game programs for computers. That's not so unusual. But the computer Jason does most of his work on is the Epson HX20—a tiny notebook-sized portable with a four-inch by one-inch screen.

"It all started about three years ago when I bought a Radio Shack pocket computer," remembers Jason. "I had a lot of fun with it. I wrote a couple of games for it and started a business that I called Software Riches. Then, when I heard about the Epson, I couldn't wait to get started on some programs for it."

Most of Jason's programs are for games, though he has done some for business, too. "Epson likes the work I'm doing. They even supply me with equipment. It's a great deal. In return, I let them give out my name and number to Epson owners who need help with programs for their computer."

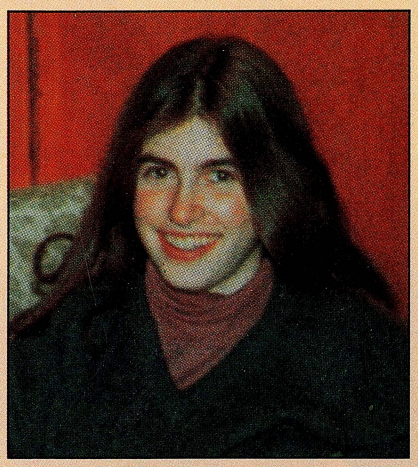
Will Jason stick to portables? "Well, I don't know about that. But I'll definitely stay with computers. It's so much fun and it's changing all the time."

Junior Scientists

Jessica Riskin, 16, used her computer know-how to become one of 10 scholarship winners in the "Westinghouse Science Talent Search" this spring. Over 1,200 science buffs had entered the nationwide contest.

Jessica and four other winners used computers in their projects. Their prizes were scholarships ranging from $5,000–$12,000.

Jessica's winning project was a complicated computer simulation. Her program simulated the behavior of plasma, an important particle in nuclear physics. Before beginning the project, Jessica had to teach herself FORTRAN. "It took me all summer to write the program, because I'd only had a little experience programming," she remembers. "It helped a lot that I'd taken courses in logic and math.



Jessica Riskin: computer novice programs a winner.

That's what programming is really all about. Besides, I couldn't have done the simulation without a computer."

First, Jessica planned the details of the simulation. "Once I had that figured out, I had to translate my ideas into a program. It wasn't easy, and I needed a lot of guidance." Eventually, she got the project done well enough to win.

Others who won for computer-related projects are: Peter Mead, 17, whose program displays chemical compounds in 3-D; Roger Hayward, 17, who worked with wind tunnels and computers; Mike Lin, 16, for an abstract algebra program; and Mark Hamburg, 17, for studying theories of language storage.

Thanks to these winners, this year's contest had a lot of byte.

Traveling Trivia, Computer-Style

Mike Haggerty spends his time traveling to country fairs and carnivals all around California. He's got an act that might turn you into a history buff—and a computer takes center ring in his show.

Seventeen-year-old Mike's act is a computer program that can tell you facts about any day in the 20th century. For instance: Who won the World Series that year? What was the price of a quart of milk and a loaf of bread? What was the U.S.'s top-selling song and who sang it? Visitors to Mike's stand pay a dollar to have birthdays, anniversaries, and other holidays researched by his computer. They then receive a print-out with all that day's trivia.

Mike worked together with his mom, Mary, to create the program. They call their show *A Window in Time*. "I did all the programming on a California Computing Systems mini-computer," recalls Mike. "My mom researched all the facts about the dates. It all took about four months.

"When we first had the idea," he remembers, "I thought it was kind of a risk—I just wasn't sure people at fairs would go for it. But we decided to try it anyway. I'm glad we did, because so far we've been really successful."

How much have they made looking into the past? "Let's say that it's in the $5000 range." Not bad.

If you don't live in California, you can still sample Mike's fascinating facts. Just send the date you're interested in, plus $1.50, to:

A Window In Time
P.O. Box 53483,
San Jose, CA 95101.

CONNECTIONS

Travelling Computer Camps

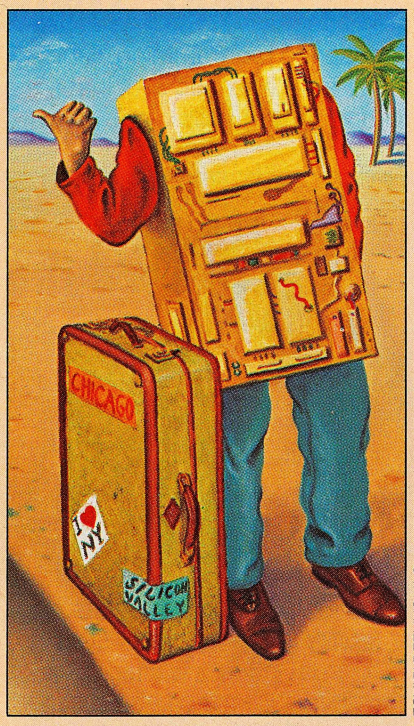
If you can't go away to computer camp, your computer camp may be coming to you. This year, Texas Instruments' Learning Centers are teaming up with YMCAs all over the country to add computer classes to Y programs.

The T.I. team expects to train around 2300 campers with 20 staff members. Travelling through Arizona, Utah, Nevada, California, Oregon, Washington, Missouri, North Carolina, and Ohio, the staff will be offering classes using the TI 99/4A and the TI professional computer. They'll also teach on the portable Unicorn.

For more information, contact the T.I. Learning Center, 100 California Street, Suite 120, San Francisco, California 94111, or call 415/392-5700.

Commodore Club Clique

Here's a user's group especially for you VIC-20 and Commodore 64'ers. For a $10 yearly membership fee, you can join the Commodore Computer Club. The club provides members with a Commodore Club Newsletter, a subscription to the club's CompuServe Information Service, and a mail order service for Commodore products not available in your area. For more information, write Commodore Computer Club, 1200 Wilson Drive, West Chester, PA 19380, or call 215/431-9100.



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Robots and Chips Hit the Road

Two major high-tech exhibits will be travelling across the U.S. in 1984 and 1985—and if you live anywhere from Massachusetts to Oregon, you'll have a chance to check them out.

The first is strictly a robot exhibit. But what an exhibit! One hundred and sixty robots—from the tiny to the towering, from Topo to toys—are included.

First stop for this mechanical crowd will be at the Fine Arts Museum of the South in Mobile, Alabama, on August 17. On October 15, it heads for Jacksonville, Florida. Later stops include Tennessee, Texas, Massachusetts, California and Illinois. For information, write the American Craft Museum, 44 West 53rd St., New York, NY 10019, or call 212/397-0630.

The second exhibit is called *Chips and Changes,* and it focuses on computers. In addition, the exhibit will have live shows, historic electronic machines and robots, too.

"It's the first of its kind," says the exhibit's Wendy Pollack. "We're looking at how technology is going to affect our lives."

The two-year national tour will be in Portland, Oregon, from June 9 to August 15. It is scheduled to go on to Illinois, Virginia, Massachusetts, Pennsylvania and other states. For more information, write the Association of Science-Technology, 1413 K Street NW, Washington, D.C., 20005, or call (202) 371-1171.

Apple III Talk

Is there an Apple III in your house? If so, Apple is offering you a lot of free back-up services. You can get free electronic mail service, lists of compatible software, and a monthly newsletter. For more information, send your name, address, and Apple III serial number to Albert Chu, Apple Computer, Mail Stop 22-A, 20525 Mariani Avenue, Cupertino, CA 95014.

To list news, contests or resources in "Connections," send them to: Listings, ENTER, 1 Lincoln Plaza, New York, NY 10023.

"Sensational, a real thriller... it's James Bond all the way."

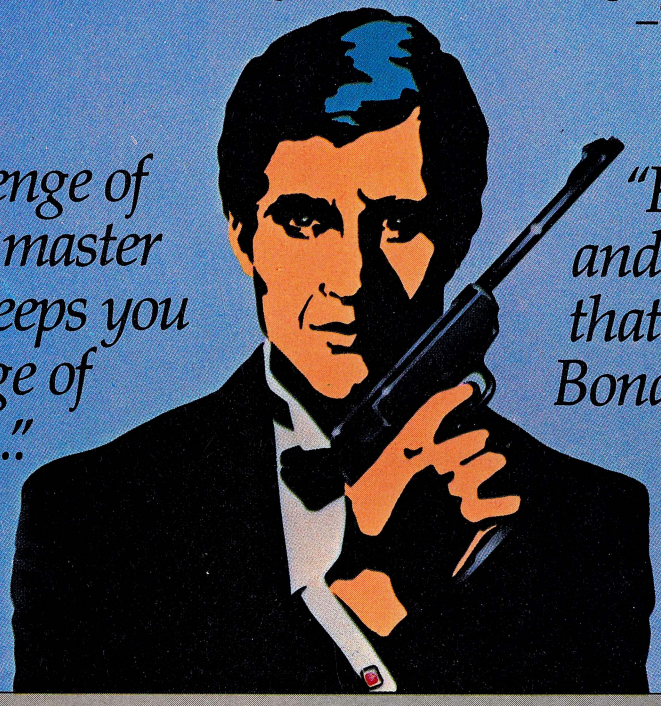
"The action was so involving, it made me feel like the master spy himself."
–Rex Weed

"You'll feel like Bond as you out-shoot and outsmart the combined forces of evil..."

"The Bond 007 home video game is like reliving the Bond classics."
–The Daily Platter

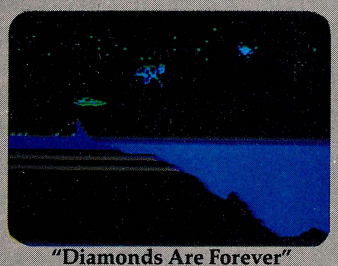
"The challenge of becoming master spy 007 keeps you on the edge of your seat..."

"One second you're hovering in mid-air dodging deadly satellites in the desert... the next you're plunged into the treacherous depths of the sea."
–The Rolling Pebble

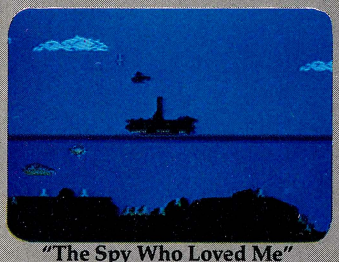


"Four land and sea escapades that rival any Bond movie adventure..."

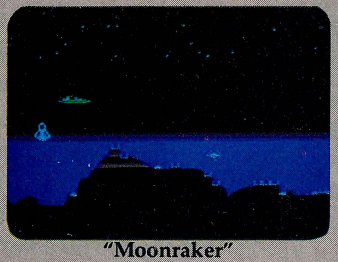
"If you loved *Diamonds Are Forever, For Your Eyes Only*, Moonraker* and *The Spy Who Loved Me*... wait until you see the Bond 007 home video and computer game."
–Boston Fleener



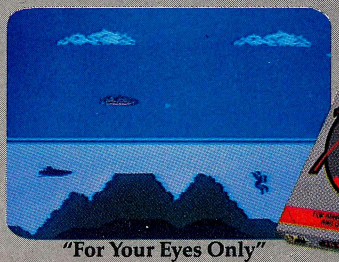
"Diamonds Are Forever"



"The Spy Who Loved Me"



"Moonraker"



"For Your Eyes Only"

Now available for Atari 2600™, 5200™, ColecoVision™, Atari® Home Computers and Commodore 64™

PARKER BROTHERS

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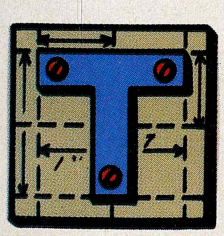
Hans On ROBOTS

INVENTOR MORAVEC CREATES ROBOTS FOR THE REAL WORLD

BY FRED D'IGNAZIO



"The two neatest ideas I had when I was a kid," says robot inventor Hans Moravec, "were to build a time machine and an intelligent machine. I thought about both machines a lot.

"I realized that the best way to build an intelligent machine was to build a robot. I built my first robot as a high-school science project," Hans recalls. "I made the robot—it was a turtle—out of one of my mother's old mixing bowls, some relays, two electric motors, and some flywheels and gears from little friction toys.

"I had lots of ideas when I was a kid, but I never thought I was very smart," Moravec admits. "I read a lot, but if I read too much, my fingers started itching. That meant that it was time to start building something again—a motor, a radio, a robot—anything."

Today, at 31, Hans is a professor at the Robotics Institute, a department of Carnegie-Mellon University in Pittsburgh, Pennsylvania. He is realizing his life-long ambition—building a robot named Pluto, that, when complete, may one day be among the most intelligent machines in the world.

Moravec's lab at the Institute is a wild clutter of robot "litter"—computer terminals, a beat-up old couch, a video game machine, and a fishing pole and a golf ball hanging from the ceiling. Much of the real work in Moravec's laboratory takes place late at night after most people have gone to bed.

"Some of the best times on this project have come late at night," says Gregg Podnar, one of Moravec's assistants. "I'll be sitting alone with Hans, just looking at the robot. We talk about what the robot's problems are and where to go from here."

Where Hans Moravec and his assistants want their robot to go is out of the carefully controlled lab environment and into the real world. While today's home robots like Topo, HERO and RB5X are great as pets and toys (see "Robots

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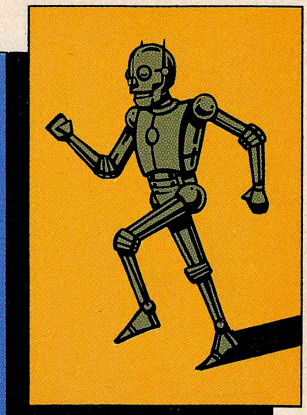
PHOTOS © MATT BULVONY

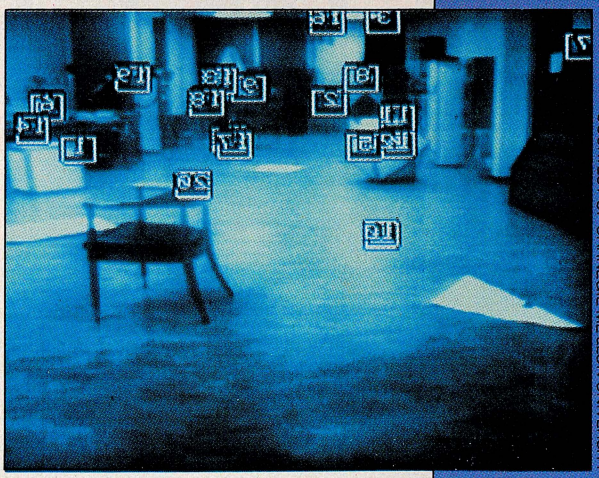


LEFT: ***Hans Moravec works on Pluto's vision system. Pluto will only enter the real world when it can see where it's headed.***

Come Home," this issue), they are almost worthless for walking dogs, making beds and doing other chores people want robots to do.

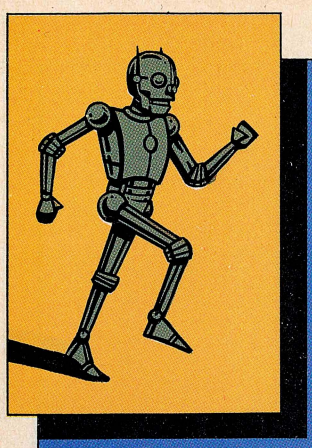
Will home robots ever be able to *really* help us around the house? Hans Moravec believes they will. He and other scientists have already built laboratory robots like Pluto that are able to act independently and react to information they receive as they move around. Pluto, for example, can "see," roll around a room on its own, and open doors. As these abilities are improved, Moravec hopes Pluto "will soon do what's never been done before: operate in the real world."

Before Pluto, Hans developed the robot Cart for his Ph.D. project at Stanford University in 1976. The Cart was a mobile robot that could roll through a crowded laboratory. No one had to tell Cart where



COURTESY OF CARNEGIE MELLON UNIVERSITY

ABOVE: ***From Pluto's point of view, a numbered screen helps the robot identify and avoid objects in a room.***



Hans On ROBOTS

Pluto will never win a beauty contest, but this 250-pound robot is at the center of Hans Moravec's breakthrough robot research. "My work," says Hans, "is a step forward into unknown territory."

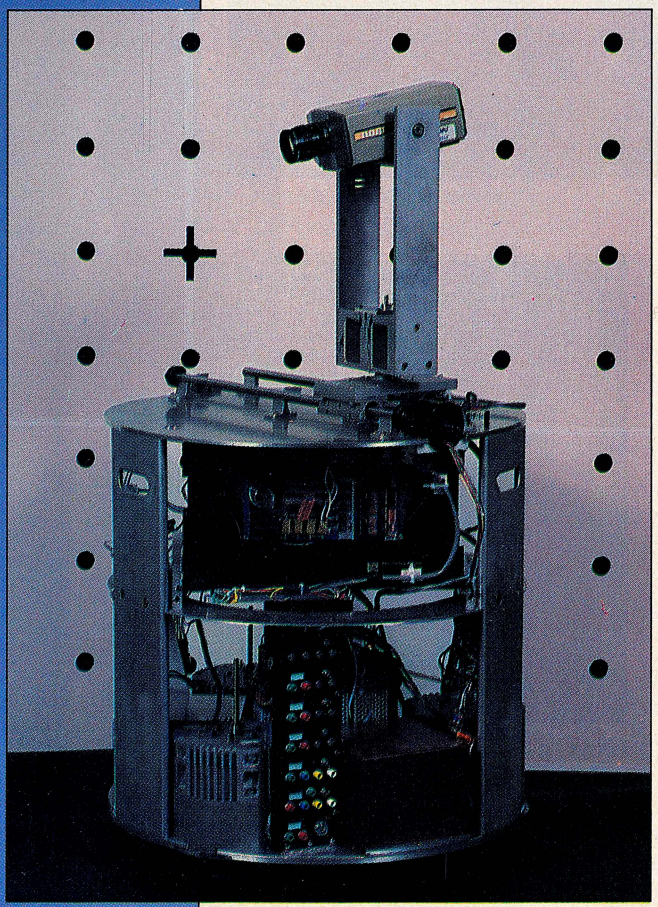
to move. It "decided" by itself, based on visual information recorded by its TV camera and processed by its on-board computer. Cart had some problems, however. It kept breaking down, and it took 10 to 15 minutes to decide on a single move.

Pluto is more reliable than the Cart, but not much quicker. It still takes Pluto several minutes to decide where to move, and then it moves only about a yard. it then stops and ponders its next move.

Pluto is much smaller than the Cart was. Pluto is a cylindrical aluminum robot about one meter (39 inches) high and half a meter wide. Pluto has three pairs of independently-controlled wheels. It is powered by six large batteries, and weighs 250 pounds.

Pluto "sees" with a computer-controlled TV camera. Fifteen advanced Motorola 68000 microprocessor chips process the images sent by the camera to determine Pluto's position. Pluto has other sensors as well. An *infrared* sensor detects heat given off by objects and helps Pluto avoid crashing into things. A *sonar* device transmits a high-frequency sound wave and bounces it off objects. Pluto's *proximity* computer then calculates how long the sound wave takes to return and helps Pluto figure out where he is.

To coordinate all this information, Pluto uses a conductor program. The conductor manages an "electronic blackboard" in a computer memory chip inside Pluto. As new messages and information flash in, the conductor posts them on the "blackboard" to share with other on-board computers.

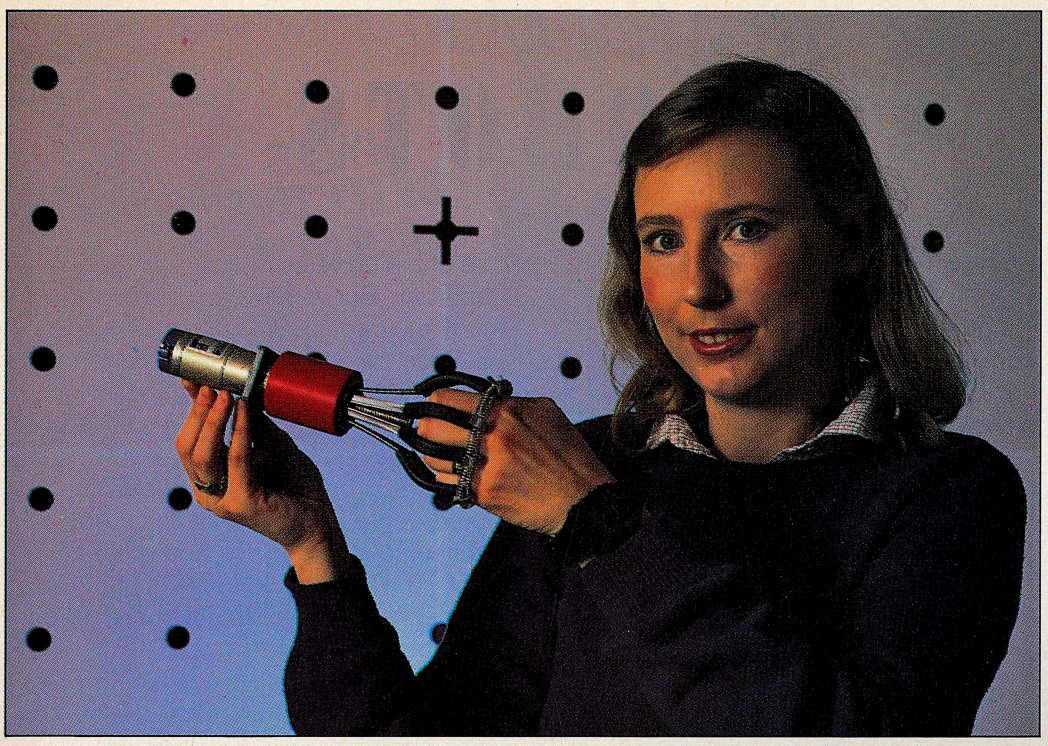


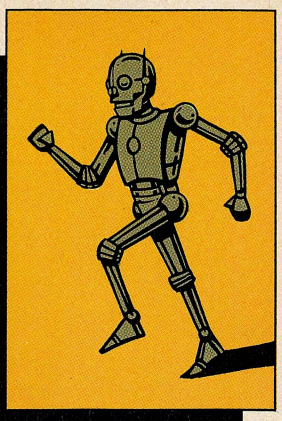
FINDING THE DOORKNOB

If Pluto is to enter the real world, it has to be able to get out the laboratory door. But opening a door is a surprisingly difficult task for a robot. "It's a lot harder than you think," says Karen Hensley, who developed Pluto's door-opening arm.

To open the door, Pluto must first find it. While finding a doorknob is a simple task for a human being, it is a big problem for a robot. Even a smart, "seeing" robot like Pluto is nearly blind in human terms.

"Processing power is Pluto's greatest handicap," says Hensley. "It would take 10 of the fastest supercomputers in the world just to give Pluto the vision of a dog. But Pluto has only its computer





Opening a door might seem a simple task. But "it's a lot harder than it looks," says robot researcher Karen Hensley. She developed this robot arm that lets Pluto get a grip.

chips and a small minicomputer."

The researchers in Hans's lab are working on this vision problem, experimenting with software programs to help Pluto see more clearly. But testing this software with Pluto proved a problem, explains computer research engineer Mike Blackwell. "Pluto is complex and there were too many things that could go wrong when they were testing," he says. "So we built Neptune, a very simple robot that's essentially a tricycle with a motor."

Pluto remains Moravec's main robot. But Neptune's simplicity lets software programmers concentrate on the vision problem.

Even with limited vision, Pluto *is* able to find the door. At that point, Pluto must be able to grip the doorknob, turn it, and pull the door open. It takes 30 pounds of thrust to open the average door, according to Moravec. This is well beyond the capability of today's home robots. But Pluto is up to the challenge. Its motors can develop 50 pounds of thrust and its arm has several "elbows," each fitted with a separate brake, so the arm can lock into any position. The robot can grip the door, lock its arm, then pull the door open by rolling back from the door in an arc.

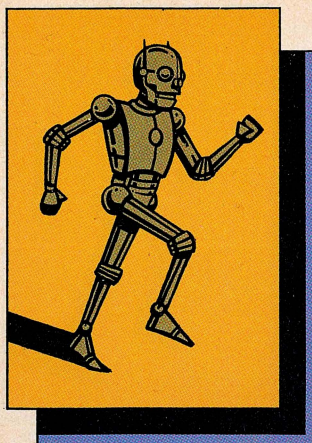
There were some problems when Pluto's arm was being designed. The biggest problem was to find a gripper (a robot "hand") that could grip a doorknob of any shape and size hard enough, without slipping on the smooth surface. "We finally found the right gripper in a janitorial catalog," recalls Moravec. "Janitors use the gripper on the end of a long aluminum pole to change the light bulbs on high ceilings."

• FUTURE ROBOTS •

Now that Pluto can make it through the laboratory door, what's next?

"I'm not trying to get Pluto to do something exotic, like play world-class soccer," says Moravec. "All I want it to do are mundane tasks, like opening a door and rolling around a house without bumping into anything—or anybody."

But Hans' dreams for a robot-filled



Hans On · ROBOTS ·

future are much bigger and more fantastic than this. "I have this old fantasy," Moravec says, "that everything in the world—everyday objects like windows, bricks, and seat cushions—could all come to life.

"Imagine an automobile that was a robot system. The seat cushions in the car, for example, could be one of the car's robots. Embedded in the stuffing of the seat cushion would be a network of tiny microcomputers. Most of the time the computers would be calculating the future of the universe or something equally important. But when you sat down on them, they would adjust themselves to your contour and give you a massage.

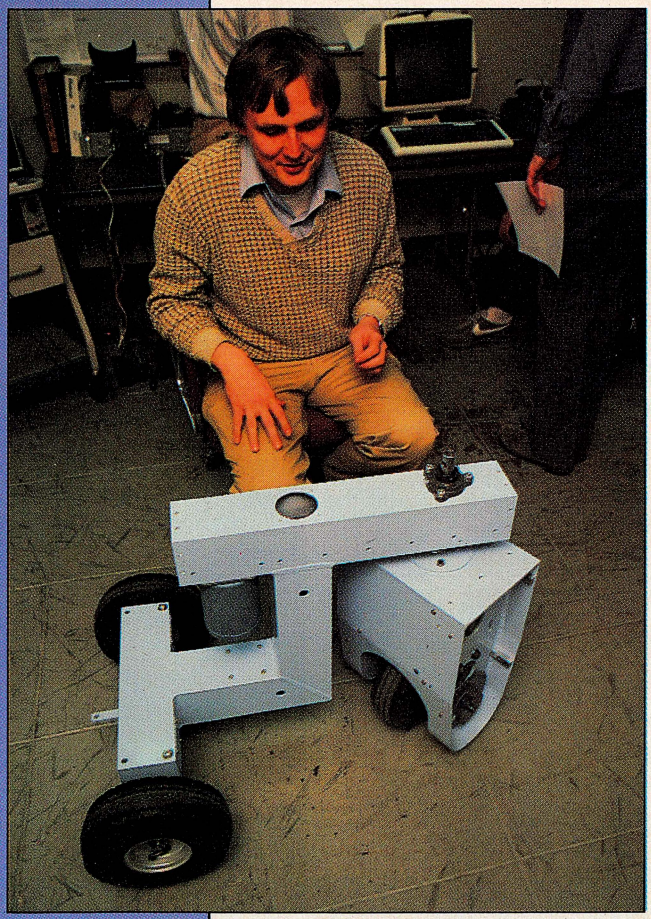
"If we had intelligent bicycles, kids would never need training wheels to learn how to ride. Tiny computers and sensors could easily balance the bicycle. They would also be able to take sonar and infrared sensor readings and avoid collisions. The bike would keep its rider out of trouble. It would be like the rider's guardian angel.

"Robots already have something very special that we humans lack," says Moravec. "That something is telepathy. Robots can read each other's minds using microwaves. Then they can use microwaves to send information around the globe and even across outer space.

"Humans living in a world of teleporting, telepathic, robots won't have a clue," says Moravec. "Millions of robots will be trading information. A person who tried to make sense of all this would be like a tourist who stands in an alley and tries to make sense of a whole city."

This strange world of robots doesn't scare Hans Moravec. He believes technology can be used to help people. He's always believed the possibilities are almost limitless.

"When I was a boy in Montreal, Canada," he says, "I read lots of comic books and science fiction. I think that's where I first got the feeling that there is so much more possible. I thought: Yes, you can go to the moon. Yes, you can build a machine that can think. Yes, you can create robots that can function in the real world. You just have to do the right things and work hard. I see my work as a step forward into unknown territory."



BELOW: ***Neptune the robot is really just "a tricycle with a motor." But Hans finds it ideal for testing experimental vision software. Neptune's effort may help Pluto to see more clearly.***

FRED D'IGNAZIO, an ENTER contributing editor, has written more than 20 books about robots and computers.

COMPUTER MYSTERY INTRIGUE

Why would a robber steal a million dollars and then give it back? Will a computerized identification program be able to identify a thief? Why would bones of archaeological significance be buried at the wrong site? The Bytes brothers—Brent and Barry, and Elana, the whiz kid, work their computer, Nibble, to answer these questions. And pose many, many more.

Each mystery is designed to be solved with the help of a home computer. It comes with a complete computer program written in a generic language compatible with all computers. And each program includes a "de-bug" section that explains the program in clear, simple language.

With The Bytes Brothers you'll find that reading is no longer passive. Because The Bytes Brothers will activate both you and your computer.

THE FIRST MYSTERY BOOKS YOU CAN PLUG INTO YOUR COMPUTER

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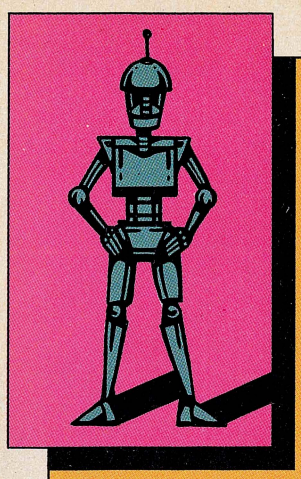


R·O·B COME

A BLINKING, BEEPING SIDEKICK CAN BE YOURS FOR AS LITTLE AS $400.

BY JIM LEWIS AND BARBARA KRASNOFF

"How may I serve you?" asks Hubot, a three-and-one-half-foot-tall home robot from Hubotics of Carlsbad, California.

Just about everyone has a good answer to that question. How about a robot that takes out the trash, mows the lawn, answers the doorbell, guards against fire and intruders, cooks dinner and, of course, helps with homework?

Unfortunately, today's home robots can't handle all these tasks. A few can guard the house or vacuum it, and one can deliver your favorite soda via its built-in refrigerator. But as of this moment, none can do very much about the lawn, the trash or your homework.

"The home robots out now are mostly toys, and not really as functional as people would like you to believe," says Laura Conigliaro, a robotics expert from New York City.

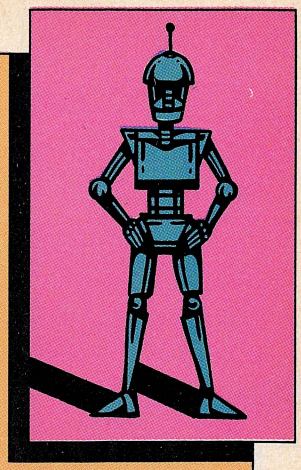
Companies that make home robots think their products are more than just "toys." But they agree that it will be a while before home robots can really do everything we want them to. "Expectations are very high," says Elayne Haggen of Androbot, a company that has created such home robots as Topo and F.R.E.D. After watching R2D2 and C3P0 behave like humans in the *Star Wars* movies, people expect today's home robots to do the same. Advances in computer technology have brought us closer than ever to having these kinds of do-it-all home robots. But, Haggen admits, "the technology still has a long way to go to make a robot as facile as a human being."

·HERO·

STARTING FROM SCRATCH

Until recently, the only home robots were just that—robots built at home. Across the country, groups of amateur robot builders would spend months—even years—assembling their mechanical creations. In the days before the microchip, these hobbyists used any kind of electronic equipment they could find or buy.

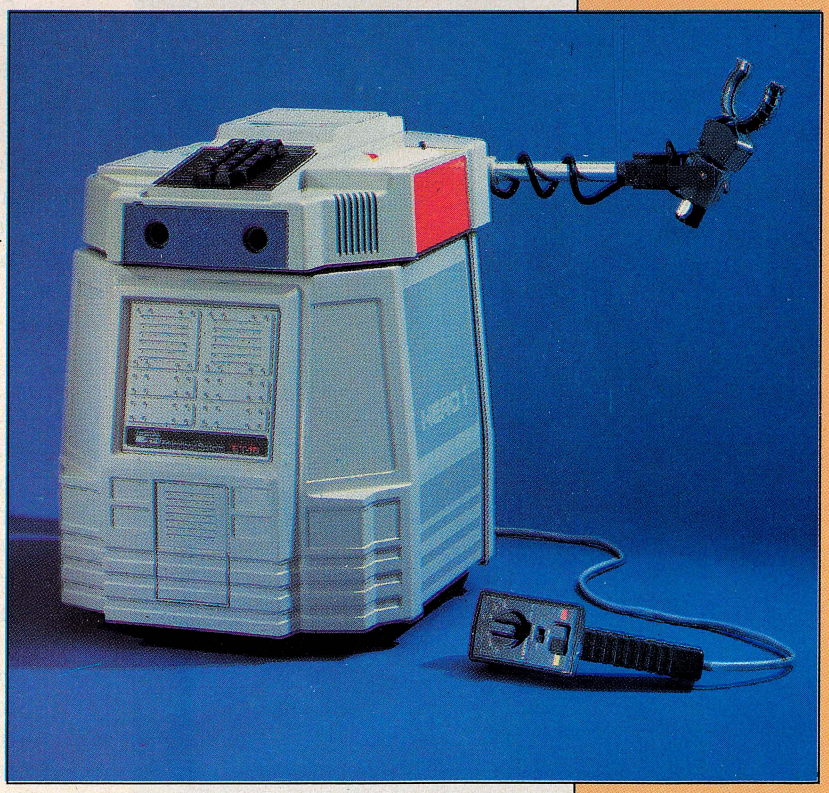
BOTS HOME



Then, in 1983, Heathkit introduced HERO 1. This robot is the ultimate do-it-yourself project. Hundreds of parts must be soldered, wired and assembled before HERO 1 will move an inch. HERO has an on-board computer that users can program to control the robot's movements, as well as light and sound sensors that enable it to avoid objects. Its mechanical arm can rotate 360 degrees and lift light (up to 16 ounce) objects.

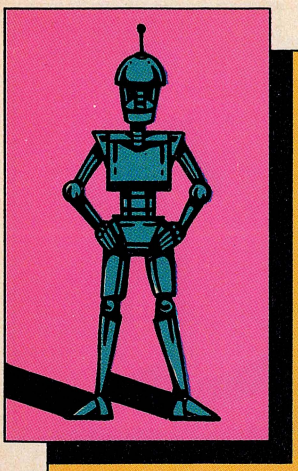
But once HERO 1 is assembled, don't expect it to help you make dinner. This home robot is designed to teach you how robots work, not to give you help around the house.

"HERO is for people who want to learn how a robot operates by building their own robot," according to Heathkit, which offers a Robotics Educational Course to teach robot owners about HERO's sensors, voice synthesis and other systems. If you're not interested in building your own robot, you can buy a fully-assembled HERO 1. But doing-it-yourself has at least one benefit: as a kit, HERO 1 costs about $1,500; fully assembled, it costs $2,500.



ABOVE: ***HERO 1, the first do-it-yourself robot kit, is a hobbyist's delight.***

ILLUSTRATIONS © BRAD HAMANN



ROBOTS

RB5X
MODULAR & MUSICAL

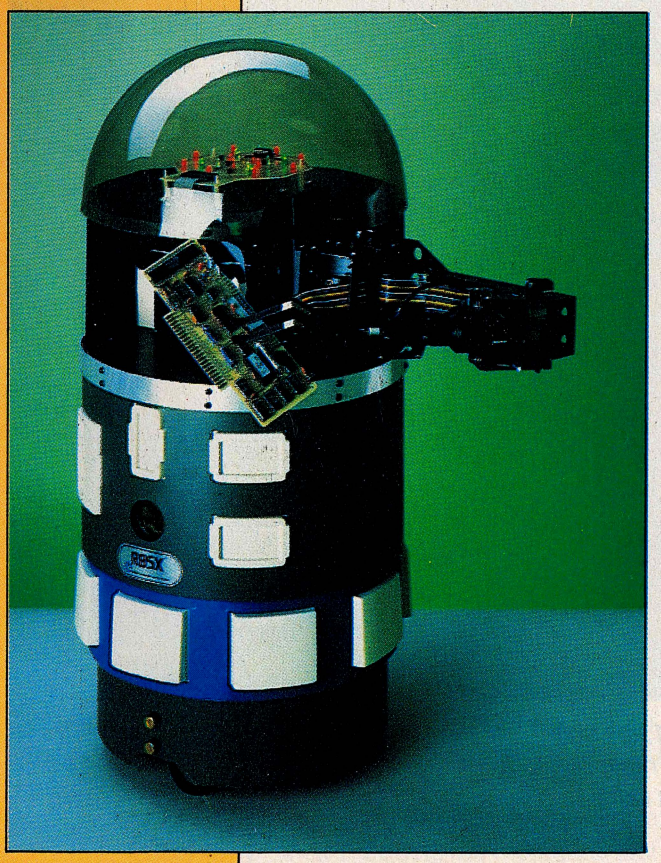
If you're worried about getting stuck with an obsolete robot, talk to the people at the RB Robot Corporation in Golden, Colorado. Their RB5X is designed to "grow with the technology," says RB's Sharon Smith.

"It's modular, and just like a computer, you can add features as you go along," says Sharon. RB offers such features as the Bumper Music module, a ring of special sensors that attach around the outside of RB5X. When this robot bumps into something, it makes music. Later this year, RB has announced, there will be a vacuum cleaner attachment for RB5X.

A "fully loaded" RB5X costs about $5,000. If you can live without the optional extras, RB5X costs $2,295.

Even if you don't buy the options, RB5X can be made to perform some useful functions, says Sharon. Some people have attached smoke sensors and fire extinguishers to turn their RB5X into a robot firefighter. Somebody out there must be working on a lawn mower attachment.

BELOW: ***RB5X is a modular robot with plenty of options—from making music to vacuuming the rug. Some folks have even turned RB into a robot firefighter.***



TURTLE
A ROBOT PET

If you're afraid to shell out a lot of money for a home robot, you may want to try a Turtle Tot. This compact robot from Harvard Associates of Somerville, Massachusetts, can draw, move around, and blink its "eyes." An optional speech package even lets Turtle Tot talk.

"A truly personal yet very affordable Turtle robot has now become a reality with Tot," says Andre Rossi of Harvard Associates. At $299 for a fully assembled robot, Turtle Tot may bring many hesitant robot buyers out of their shell.

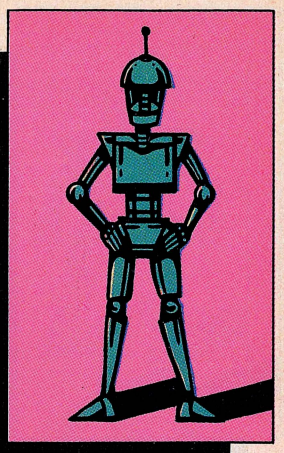
HUBOT
FUN ON WHEELS

At present, there seem to be two kinds of home robots in the world: educational robots like Heathkit's HERO 1, that teach you how robots work, and robots like Hubotics' Hubot, whose only aim is to help you have a good time.

Hubot, which asks "How may I serve you?" every time it is switched on, is a rolling party. This $3,495 robot comes with a built-in television set, AM/FM radio and tape deck, Atari 2600 game system, clock, serving tray and 128K computer.

"We're trying to make Hubot interesting to the whole family," says Bob Sachs of Hubotics. Bob insists that Hubot is "functional" as well as "fun." To prove this,

COME HOME



Hubotics says it will have a Smart Servant feature for Hubot later this year. With this module, the company claims, Hubot can serve as a control station for your home appliances. Want a banana milkshake? Tell Hubot to turn on the blender. (Unfortunately, you'll still have to pour the milk, scoop the ice cream and slice the bananas....So far, no robot maker has introduced a banana-slicing module.)

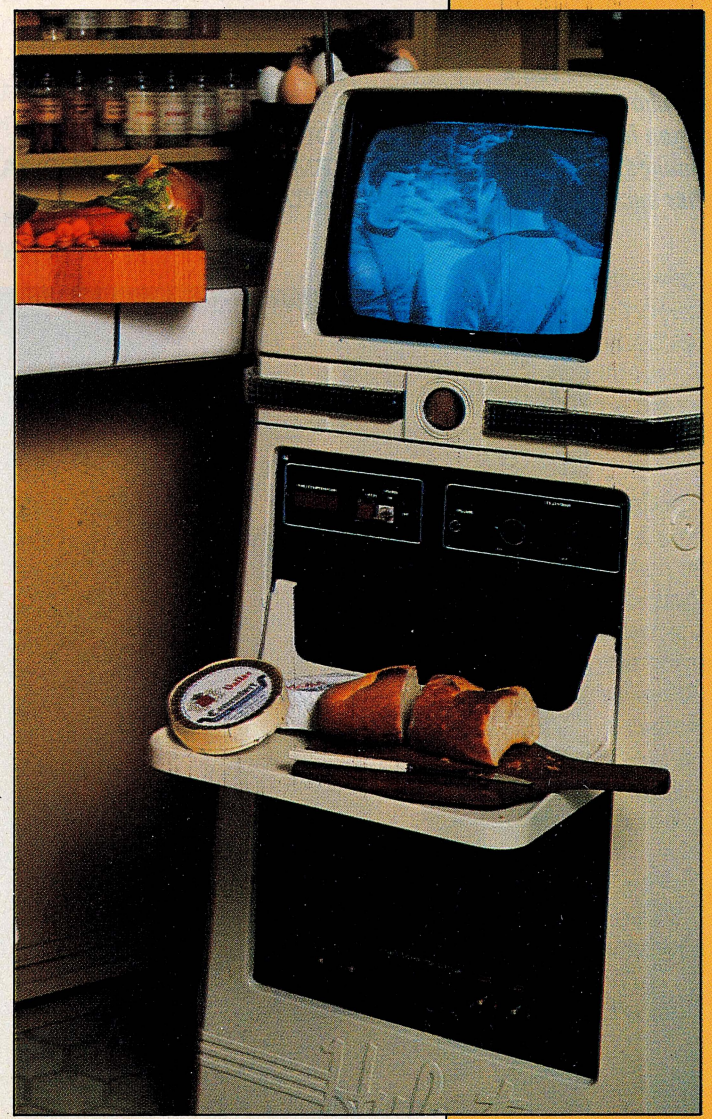
transporting tools, or delivering an ice cold soda using its built-in AndroFridge.

That satisfies our thirst, but we're still hungry for a robot that can help us with our homework.

Want to know more about robots, and how to program them? Turn the page.

JIM LEWIS is senior editor of ENTER. BARBARA KRASNOFF is a freelance writer.

BELOW: ***Hubot the robot is a party machine, with built-in TV, radio, computer and more.***



ANDROBOT

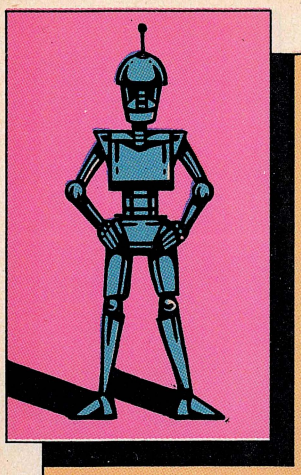
ALL IN THE FAMILY

Androbot, a robot-making company created by Atari founder Nolan Bushnell, offers a "family" of robots.

There's a strong family resemblance, too. Each member of the Androbot family looks like some kind of geometric snowman. At a mere 12 inches tall, F.R.E.D. (for *F*riendly *R*obotic *E*ducational *D*evice) is the shortest family member. F.R.E.D.'s only goal in life is to demonstrate basic robotic functions. F.R.E.D., which sells for about $350, has an attachment that lets you draw pictures on paper and your computer screen at the same time.

Topo , F.R.E.D.'s big brother, stands three feet tall and sells for about $1,600. According to Androbot engineer Bill La, Topo has a voice synthesis system that lets you type a word into your computer terminal and have Topo say it. "You can even change the tone of voice, so that Topo can sing," says Bill.

But the boss of the Androbot family is B.O.B., whose initials stand for *B*rains *O*n *B*oard. While Topo and F.R.E.D. owners are anchored to the computers controlling their robots, B.O.B. has a "mind" that consists of two microprocessors and a three–megabyte operating system. It will let B.O.B.'s owners write a program (or use one of the programs available from Androbot), then step away and let B.O.B. go its own way—bringing in the mail,



ROBOTS COME HOME

PROGRAMMING YOUR HOME ROBOT

How hard is it to program a robot? To program one to put together cars on an assembly line, you'd need years of experience. But, makers of home robots like Topo and F.R.E.D. try to make programming their "droids" easy enough for a beginner. Reprinted below is a simple program that makes Androbot's Topo walk in a square. The same program is written in three different languages: BASIC, LOGO and FORTH.

TOPOBASIC

```
5    REM SET-UP LOOP
10   FOR J = 1 TO 4
15   REM COMMAND = FORWARD,
     DISTANCE = 100
20   C = F : P1% = 100
25   REM EXECUTE THE
     COMMAND
30   GOSUB 2
35   REM COMMAND = LEFT,
     ANGLE = 90
40   C = L : P1% = 90
45   REM EXECUTE THE
     COMMAND
50   GOSUB 2
55   REM END OF LOOP
60   NEXT J
```

Note: GOSUB 2 sends you to a subroutine that is built into Topo BASIC. That's why there's no line 2.

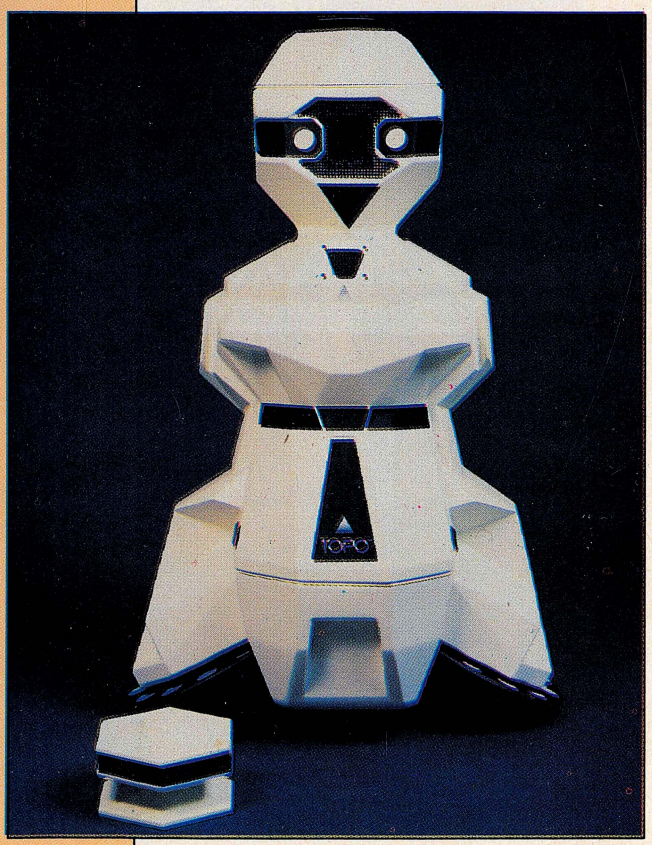
TOPOLOGO

```
TO SQUARE
REPEAT 4 (TFD 100 TLT 90)
END
```

TOPOSOFT

```
: SQUARE
4 0 DO
100 FWD 90 LEFT
LOOP ;
```

BELOW: ***Topo can talk, sing and even do some simple chores. An add-on wagon lets it haul a few pounds of groceries or other such goodies.***



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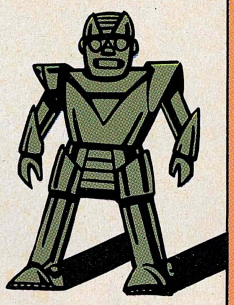
Benton Harbor, MI 49022
Hubotics, Inc.
6352-D
Corte Del Abeto
Carlsbad, CA 92005
Harvard Associates, Inc.
260 Beacon Street
Somerville, MA 02143

R·O·B·O·T HALL OF FAME



The robots are here! Mechanical creatures are currently bleeping and blinking in American factories, homes and research centers. But people have been fascinated by robots long before technological breakthroughs made them a reality. Science fiction stories, movies and plays have been filled with robot-like creatures for more than 60 years.

The very first robot arrived in 1921 in a play called *R.U.R.* Czechoslovakian author Karel Capek used the word "robot" (which means "forced labor" in Czech) to describe the metal people in his play. Actually, *R.U.R.*'s metal people were human actors.

The first science fiction stories that followed *R.U.R.* featured evil robots. *Metropolis* and many other movies of the 1920s, 30s and 40s showed robots who turned on their masters. Then, in the late 1940s, science fiction writer Isaac Asimov wrote the classic story "I Robot." In it, Asimov changed the evil image of the robot and set forth the three rules of robotics:

RULE 1: A robot must never hurt a human or through its actions allow any human being to come to harm.

RULE 2: Robots must obey human orders, unless they conflict with Rule 1.

RULE 3: Robots must never hurt themselves, unless doing so conflicts with Rules 1 and 2.

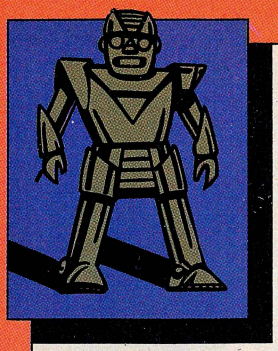
Although these rules were simply part of a science fiction story, they have proven very important to development of robots during the past quarter century.

"I doubt there's anyone involved in robotics who hasn't read my stories," admits Dr. Asimov. Indeed, Joseph Engelberger of Unimation, who helped to create the first practical industrial robot, claims Asimov's stories played a big part in his vision of what a robot should be.

That first real robot, called Unimate, went to work at an auto factory in 1961. Since that time, more than 15,000 robots have joined the workforce. A few robots have come home. And friendly robots like R2-D2 and C3PO have become star attractions.

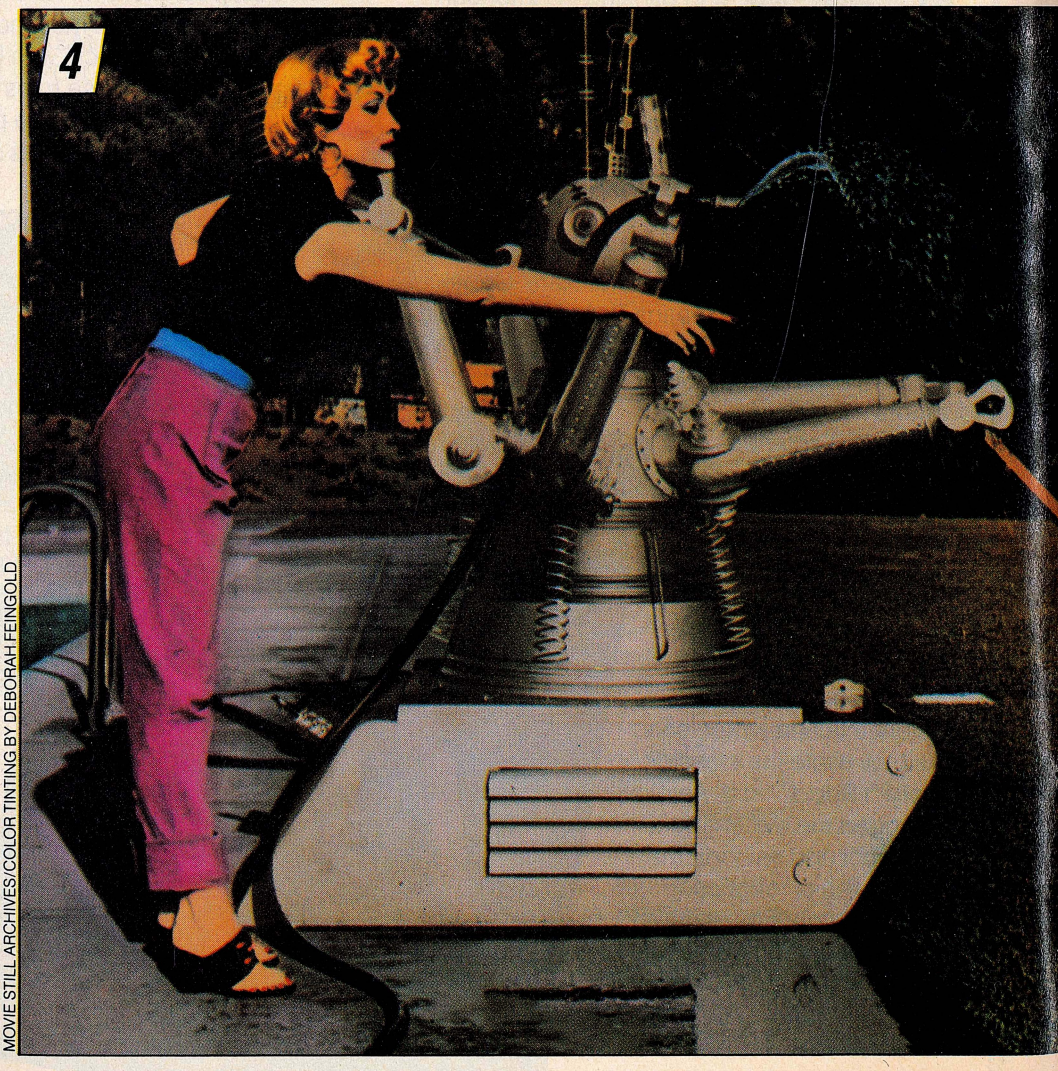
On the following four pages, we've rounded up some of the most interesting, silly, and famous movie and TV robots — and elected them to the ENTER Robot Hall of Fame.

ILLUSTRATIONS © BRAD HAMANN



• ROBOT • HALL • OF

MEMORY SHOP



MOVIE STILL ARCHIVES/COLOR TINTING BY DEBORAH FEINGOLD

1 *In 1972's* Silent Running, *Freeman Lowell lived in space with robots Huey, Dewey and Louie. They were companions, friends—and good poker partners.*

2 *"Mechani-Kong" took on the King in 1968's* King Kong Escapes. *This mechanical monster was built by the evil Dr. Who.*

3 Satan's Satellites *(1951) featured the fearless Commando Cody saving Earth from aliens—including this rather clunky robot.*

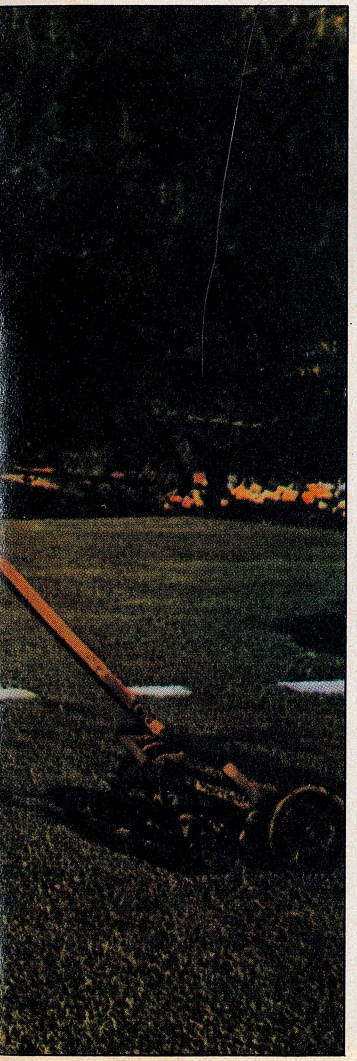
4 *Gog, star of 1954's* Gog, *did household chores for a while—but then began mowing down earthlings.*

5 *These glittering warriors from planet Cylon starred in 1978's TV show* Battlestar Galactica. *Their user-unfriendly mission? Destroy all human life.*

6 *In 1951's* The Day the Earth Stood Still, *Gort was a robot with a message: Earthlings must stop making war or Gort will destroy the planet.*

3

SATAN'S SATELLITES
featuring
JUDD HOLDREN · ALINE TOWNE · WILSON WOOD · LANE BRADFORD · STANLEY WALKER
Written by RONALD DAVIDSON · Associate Producer FRANKLIN ADREON · Directed by FRED C. BRANNON · A REPUBLIC PICTURE



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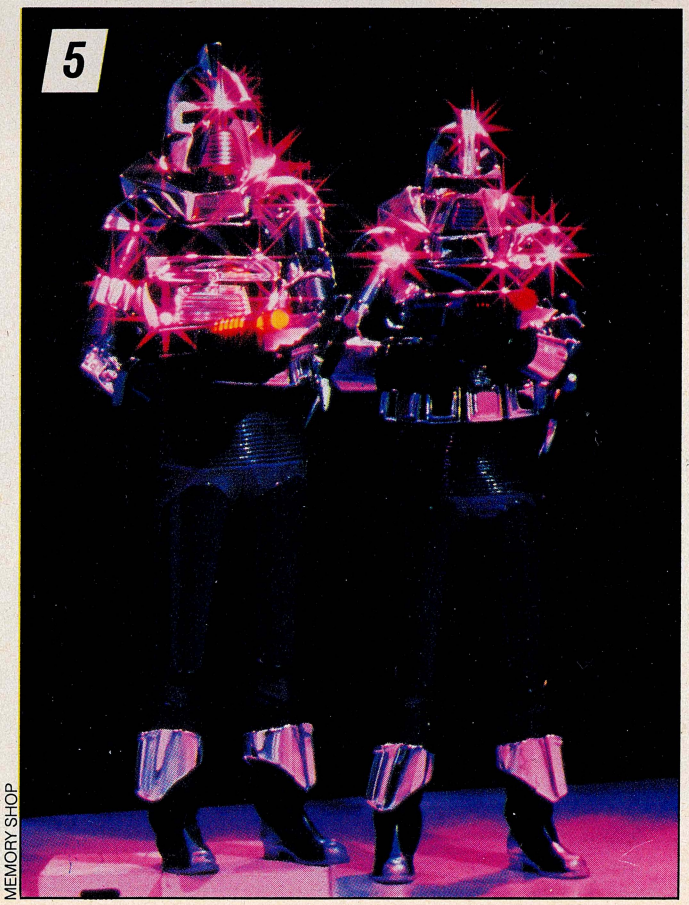

MEMORY SHOP

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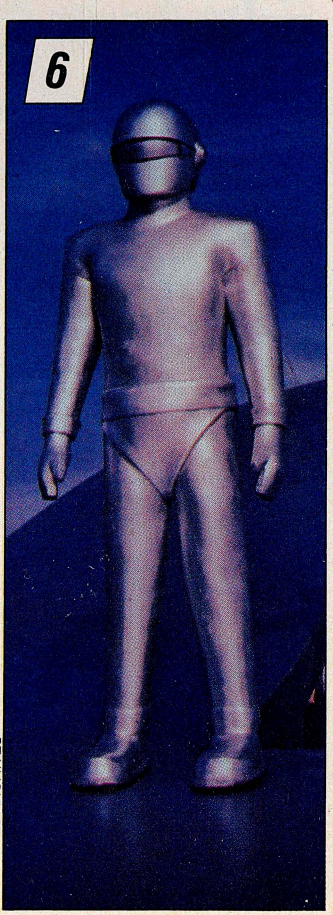
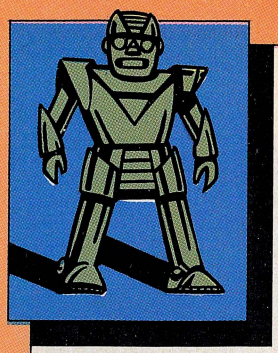


MOVIE STILL ARCHIVES



· ROBOT · HALL · OF

7 *These mean machines guarded the spaceship Cygnus, run by the mad scientist Dr. Durant in* The Black Hole *(1979).*

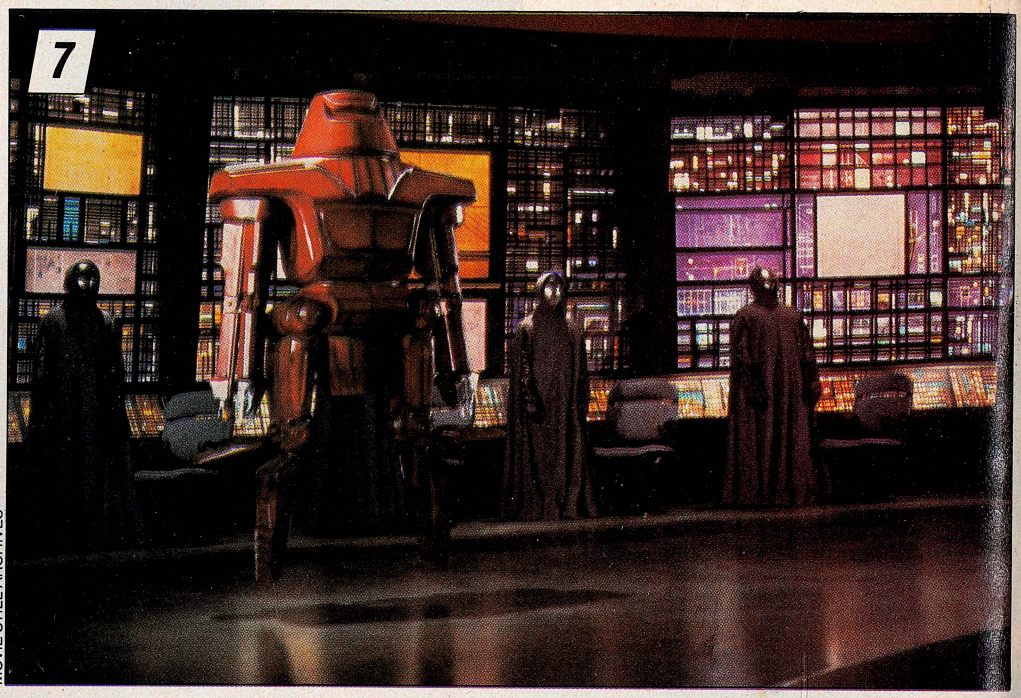
8 *Recognize these droids? R2D2 and C3PO were the ultimate odd couple in* Star Wars *and its sequels,* The Empire Strikes Back *and* Return of the Jedi.

9 *Tobor (robot spelled backwards) was the hero of 1954's* Tobor the Great. *When its inventor was kidnapped, Tobor rescued him.*

10 *Robots get hungry, too—at least they did in the mid-60s TV show* Lost In Space. *Here, 'Robot' snacks on a hot dog.*

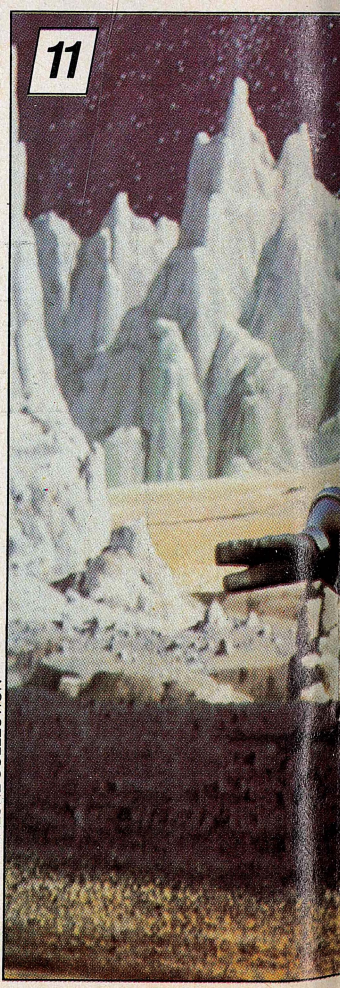
11 *Rambling around this moonscape is Robby, one of the friendliest robots in movie history and the star of 1956's* Forbidden Planet.

12 Buck Rogers in the 25th Century *featured a wisecracking robot. Twiki could always be counted on to buck up its master's spirits.*



MOVIE STILL ARCHIVES

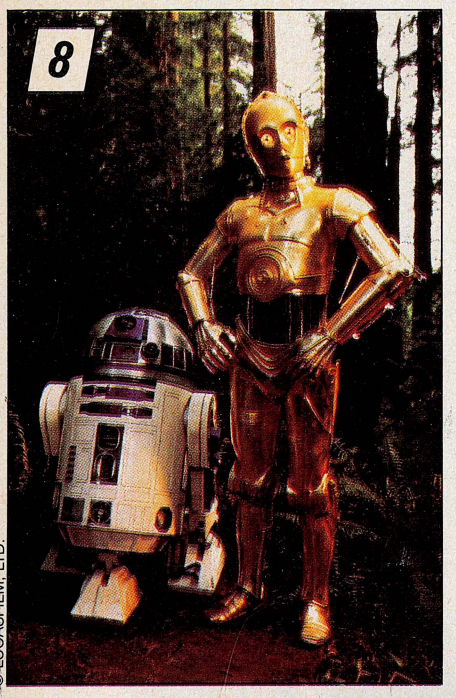
MOVIE STILL ARCHIVES



COURTESY OF W. MALONE COLLECTION

• FAME •

8



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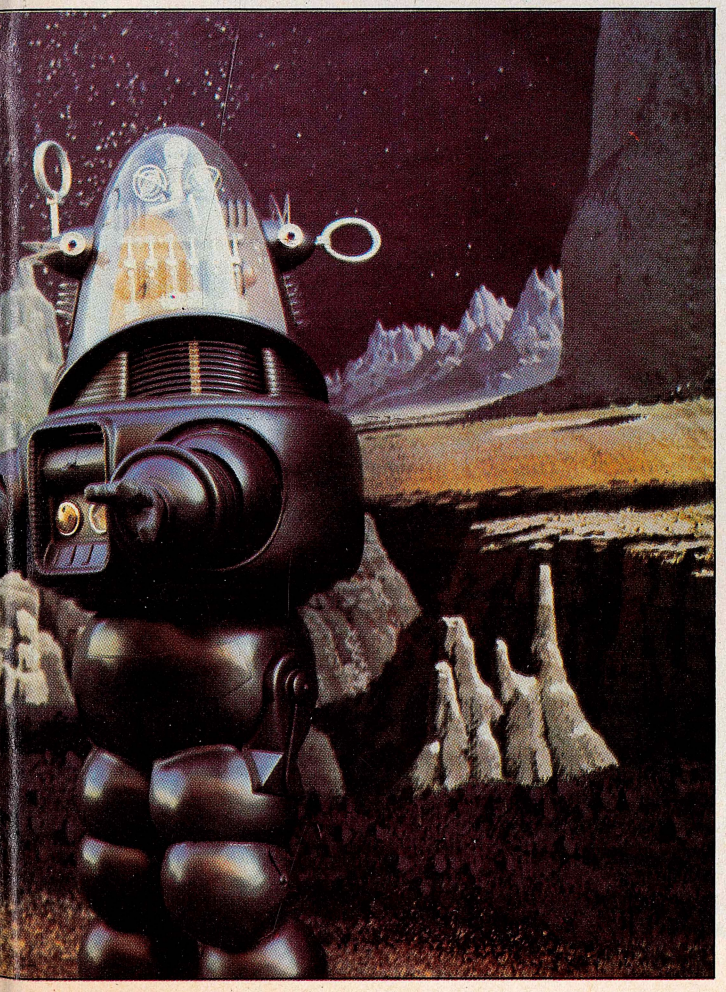
9

REPUBLIC PICTURES presents
TOBOR THE GREAT
CHARLES DRAKE · KARIN BOOTH
BILLY CHAPIN · TAYLOR HOLMES · STEVEN GERAY
Screen Play by PHILIP MacDONALD · Story by CARL DUDLEY · Directed by LEE SHOLEM
A DUDLEY PICTURES CORPORATION PRODUCTION



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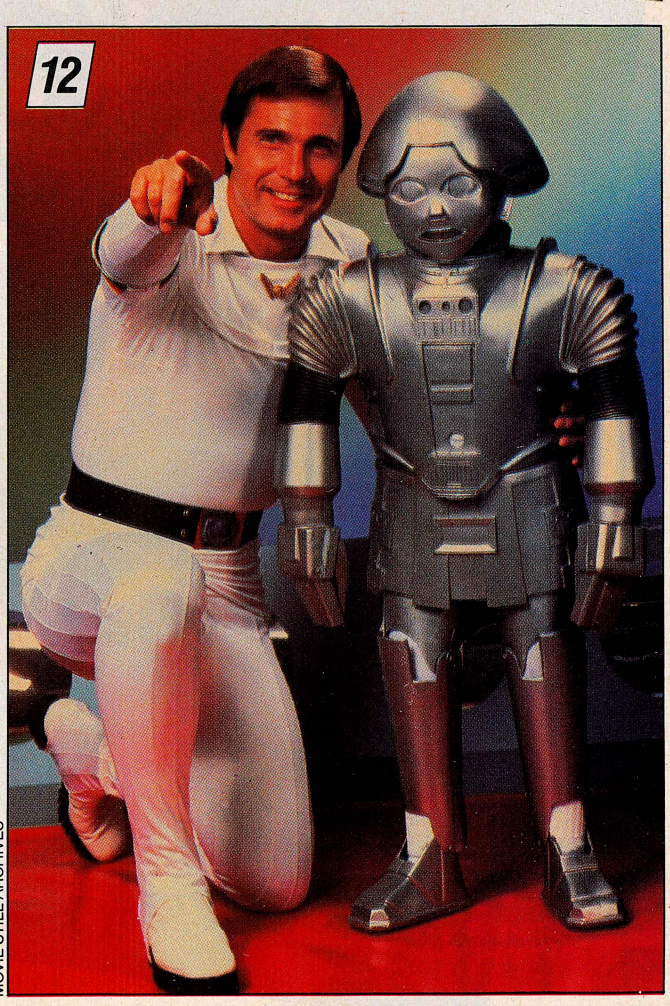
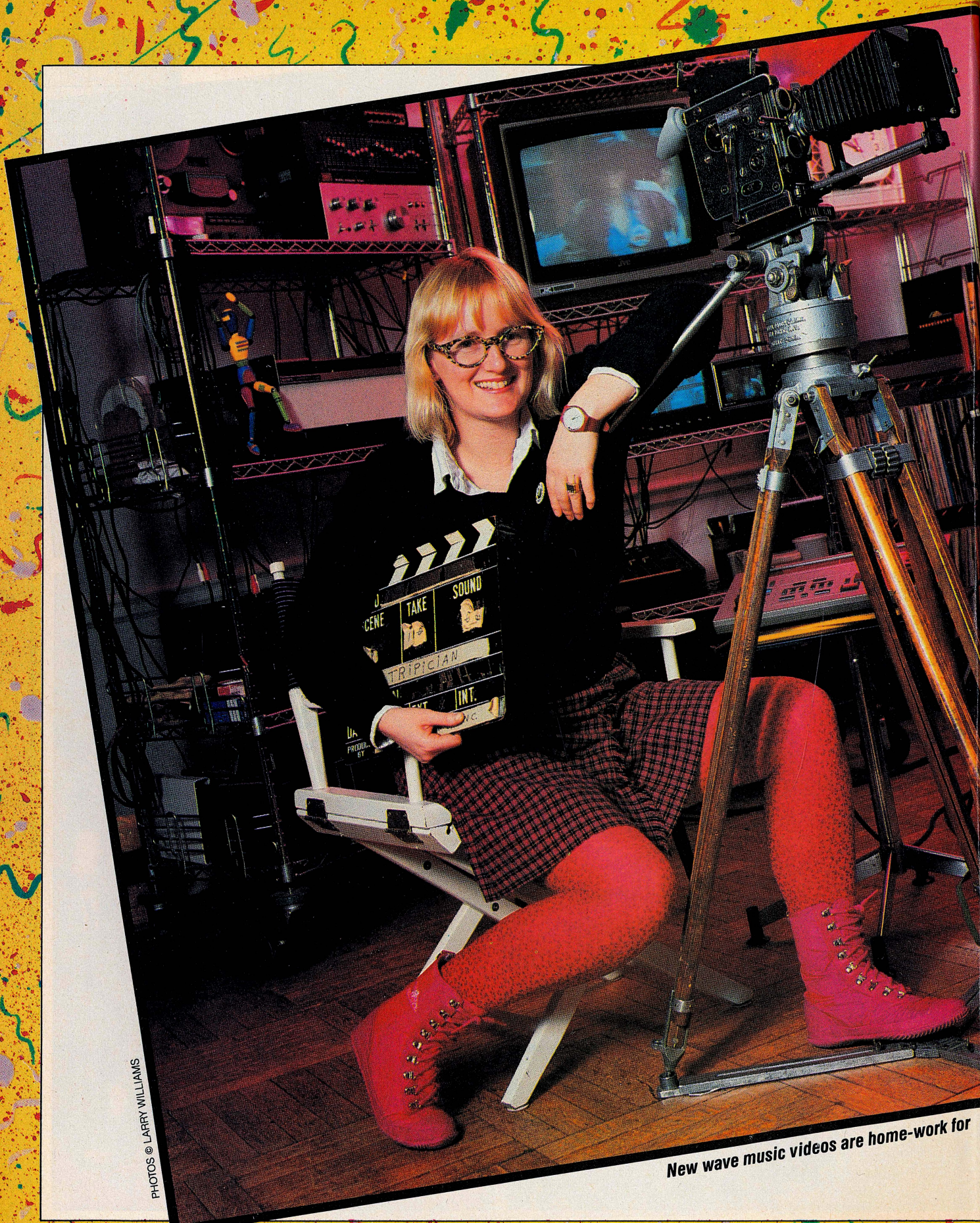


MOVIE STILL ARCHIVES



PHOTOS © LARRY WILLIAMS

New wave music videos are home-work for

creator/director Merrill Aldighieri.

MAKING MUSIC VIDEOS

MERRILL ALDIGHIERI MIXES MUSIC AND MICROS

BY PAM BRANDT AND LINDSY VAN GELDER

Unless you spent last winter under a large boulder in the Himalayas, you're probably familiar with *Thriller,* Michael Jackson's monster (in all senses of the word) rock video.

Of course, Michael isn't the *only* rock star turning music into something you can hear *and* see. With outlets like MTV (cable TV's music channel), and network TV shows like NBC's *Friday Night Videos* and ABC's *Hot Tracks,* music videos are getting lots of airplay. Even *Captain Kangaroo* has been hit with music video fever. The Captain's TV show has featured videos by Rick Springfield and Men Without Hats, among others.

Merrill Aldighieri is one of the people who's helped this high-tech art get started. This 32-year-old woman from New York has made lively videos of everyone from Kermit the Frog to British pop artist Man Parrish. Merrill combines live action with animation and a variety of startling, computer-generated special effects to give music a whole new look.

FROM NOVELTY TO STANDARD

If this story were a music video, you'd now be listening to frenetic drum beats and watching the pages fly off the calendar. We're going back to 1979, when Merrill got her music video "break" at Hurrah, a New Wave nightclub in New York City.

Hurrah was the first club in the U.S. to install a big closed-circuit TV screen on the dance floor. The screen was a novelty item, like a disco fog machine. Deejays played records while unrelated movies flickered on Hurrah's big screen. At the time, videotape technology existed, and so did rock and roll. But

Danspak to Debussy: Merrill's work spans a music spectrum.

no one had put the two together skillfully. (The few music videos which did exist were mainly used to promote American bands to European audiences, and most of them didn't use high-quality sound tracks.)

Merrill was asked to show one of her videotapes at the club, making her one of the first *veejays* (video disk jockeys) in the country (and *the* first female veejay). She began experimenting with making films that actually related to the music the dj's played. Later, she began making high-quality tapes of live band concerts. Pretty soon, the phenomenon spread to other clubs and other cities. With the debut of MTV (which now reaches over 12 million homes) in the summer of 1981, rock videos went national , and the music video market skyrocketed.

GOING PLACES

Merrill has moved right along with the industry. Her latest work (released by Sony) is a "video 45" called *Danspak*. It's a 20-minute collection of five video clips by four New Wave artists: Man Parrish's "Hip Hop, Be Bop (Don't Stop)", Shox Lumania's "Falling" and "Pointy Headgear," Richard Bone's "Alien Girl," and Living's "Boat Talk." This video includes such computer-generated special effects as frame-within-a-frame shots of the ocean, fiery squiggles shooting into space, leaves rushing toward the camera like a meteor shower, and scarlet-skinned people. It also includes something called "rolling," which looks like a crazed "horizontal hold" mishap on your TV.

HIGH-TECH DOODLING

Merrill first experimented with film when she was in high school in New Jersey. But she didn't start working with video until she went to the Massachusetts College of Art in 1970. It was there that she learned Lesson Number One about high-tech success: you don't have to have an advanced degree to be able to use the equipment. "The video set-up [I was using] was pretty sophisticated for its time," she recalls, "but only the school's janitor knew know to operate it."

Today, Merrill adds, "Most of my knowledge in video has been through practical experience." Sometimes she doesn't even know the names of the machines she works on, but she likes pushing the buttons and twirling the knobs until she figures them out. Merrill especially advises girls not to be put off by technical jargon and the common assumption that computers are for guys.

"The important thing is not to give up or feel guilty if you can't do everything yourself," she says. "What matters isn't exactly *how* a thing gets done, just that it's *done.*"

Merrill didn't walk right into a high-tech career. She did a stint as a waitress, and admits that she was "terrible." But one day, she overheard a customer complaining that he couldn't find anyone to operate a camera at the local TV station. Merrill got the job. (That was Lesson Number Two: being a klutz with a coffee pot doesn't mean you can't be a wizard with video.)

Eventually, Merrill went to New York, where she got a job as an animation apprentice. There, she met and married one of the other

apprentices, Joe Tripician. Merrill and Joe then went to work several years for *The Muppets*, where they learned a lot of new video techniques. Today Merrill and Joe head their own company, Co-Directions, Inc., which produced *Danspak*.

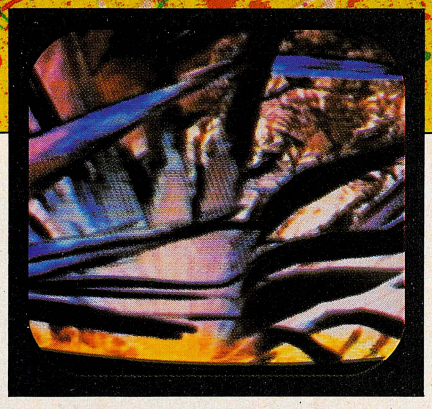
THE THREE STAGES

Video-making, says Merrill, is usually divided into three stages. The first phase is actually shooting footage. Merrill uses either a camera (film or videotape—she likes both) or a video synthesizer (a machine whose screen shows you the shapes of sound waves, and lets you program them into all sorts of animated images).

The second phase involves film-to-tape transfer. That's a job Merrill usually does in a studio on a machine called a *Rank Cintel Flying Spot Telecine*. On one level, the machine simply copies film images to tape images. But during this process, all sorts of special effects can be added.

Sometimes wonderful things have happened by mistake. "I'm interested not just in what the machine was designed to do, but in what it was designed *not* to do," Merrill says. "I look for ways to create *unexpected* imagery. Using high technology this way appeals to my sense of humor—it's like making a machine pull its pants down." As an example, she points out a special process that's normally used to make people's skin tones look natural. "We try to use it to make our film look *unnatural*," Merrill grins. (Look for the super-weird, phosphorescent-red faces on *Danspak*.)

Finally, the video is edited, a job Merrill usually does at home on two Sony tape decks and a video controller. Sometimes, if the video requires additional special effects, there's a fourth phase of production, back in the studio.



© JOE TRIPICIAN

High-tech doodling is standard in Merrill's videos. Frame-by-frame,* Danspak *shows the results.

DO-IT YOURSELF

If all of that sounds awfully expensive, it's actually fairly shoestring by *Thriller* standards. (*Thriller* cost $750,000 to make. *Danspak* cost less than $5000 per clip.) Merrill doesn't believe that you have to spend a fortune to make a terrific video. A certain amount of equipment is necessary, but not as much as you might think—and the main ingredient is imagination. In fact, she says, anyone with access to a camera, a video recording deck, an Apple computer and a KoalaPad—a special graphics pad, which comes with a stylus and software—can start experimenting.

"You can do things like combining live action near the TV screen—maybe get a big fish tank and experiment with pouring things in front of the TV while you're showing your video on the TV and re-shooting it with your camera," she says. A bargain-basement way to get your hands on editing equipment, she adds, is to see if your city has community access cable TV facilities.

What's next for Merrill? Actually, she's currently working on something really revolutionary: a *classical* music video, with sound track by Debussy. But with Merrill at the controls, the classics may get a whole new look!

PAM BRANDT is a writer and musician. LINDSY VAN GELDER wrote "Lighting Up Broadway" in ENTER's February, 1984, issue.

Judging 'Junior'

BY RICHARD CHEVAT AND BELA SELENDY

To some people, the name IBM *means* computers. And now that IBM has come out with a home computer, the PC*jr,* a lot of those people are lining up to buy it.

IBM may set the standard for business computers, but what do they know about the needs of home users? Does PC*jr* make Atari, Commodore and TRS-80 obsolete? And should the home user shell out hundreds of extra dollars just to own something with the IBM name? These were some of the questions we set out to answer when we unpacked and tried out our PC*jr.*

WHAT YOU GET: HARDWARE

Aside from the initials PC, the PC*jr* doesn't look much like its big brother, the IBM PC. It consists of a system unit and a keyboard that's so light it felt flimsy when we first picked it up. The PC*jr* is available in two models. The *Entry* model costs about $669 and comes with 64K RAM and two cartridge slots. The *Enhanced* model, which we used, costs $1,269 and includes *one* disk drive (5¼ inch), additional chips for better color and graphics, and a total of 128K.

These prices are deceiving, however, since you have to pay extra for things you absolutely will need. These "extras" include a connector for your TV or monitor ($30), and the Disk Operating System (DOS) for the Enhanced model ($65).

MEMORY: The PC*jr* is not expandable beyond 128K, but that is more than enough for most home users. And a device will probably come out at some point to let you expand the PC*jr*'s memory.

KEYBOARD: It's adequate, but we can't understand why—for $700—IBM couldn't provide a standard typewriter keyboard like Com-

modore or Atari. Instead, the PC*jr*'s keys are "chiclet" size—rubbery rectangles that are spaced further apart than on a regular keyboard. And if you're not a touch typist, you may have trouble. There are no symbols or letters printed on the keys. Instead, the symbols are on labels on the surface of the keyboard.

IBM designed the keyboard this way so it can be used with overlays that fit between the keys. For example, there's an overlay that shows you how to use *HomeWord,* an IBM word processing package.

The most unusual thing about the PC*jr's* keyboard is that it's not attached to the system unit by a cord. Instead, it transmits infrared signals to the system unit from as far as 20 feet away. This worked well when we used it, except when Bela held it in his lap. Then, the table top blocked the infrared beam. (You *can* hook the keyboard up with a cable and avoid any interference problems.)

GRAPHICS: The PC*jr* has a range of colors as good as any home computer, and an excellent screen display. (However, the display of the Entry model is not as good as the Enhanced model we worked on.) It also has very good graphics commands that are not available on most other machines. For example: CIRCLE, which you also get on the TRS-80, allows you to draw circles with one statement. PAINT allows you to fill an area of your screen with a color.

SOUND: The PC*jr* also has very good musical abilities. Its SOUND and PLAY functions allow you to control three separate voices at one time. They are easy to use.

PERIPHERALS: A thermal printer is available from IBM for $175. So is a color monitor for $680, and joysticks for $40 each. One thing you can't add right now is a second disk drive. Again, we suspect that someone will come up with an add-on second drive in the future.

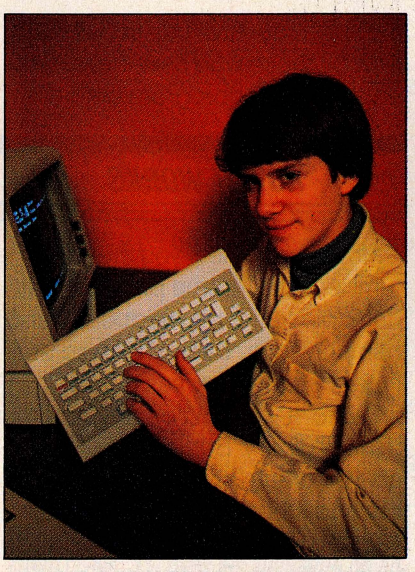
SOFTWARE

BASIC: Both models of the PC*jr* come with "cassette BASIC" built in. We felt that anyone who wants to program on this machine will want to buy the cartridge BASIC. It retails for $75, and plugs into one of the cartridge slots in the front of the machine. Not only does cartridge BASIC give you a greater range of commands, it also gives you an 80-column display and better graphics.

OTHER SOFTWARE: Even though the PC*jr* has only been on the market for a few months, there's already a wealth of software available, including games, home financial plans and word processing. All major software producers are writing for the PC*jr.* You can count on this continuing in the future.

We played two of the games IBM supplied us with, *Mouser* and *Crossfire.* We had no complaints, except that the IBM joystick requires a light touch; you can't really grab it like Atari's.

IBM COMPATIBILITY: This really doesn't help you with your homework or *Donkey Kong,* but it may be important to your parents if they use an IBM PC at work. They should know that the PC*jr* is PC compatible, but can't run software that needs more than 128K at any point.



© KIM BUTLER

Bela and the jr's wireless keyboard.

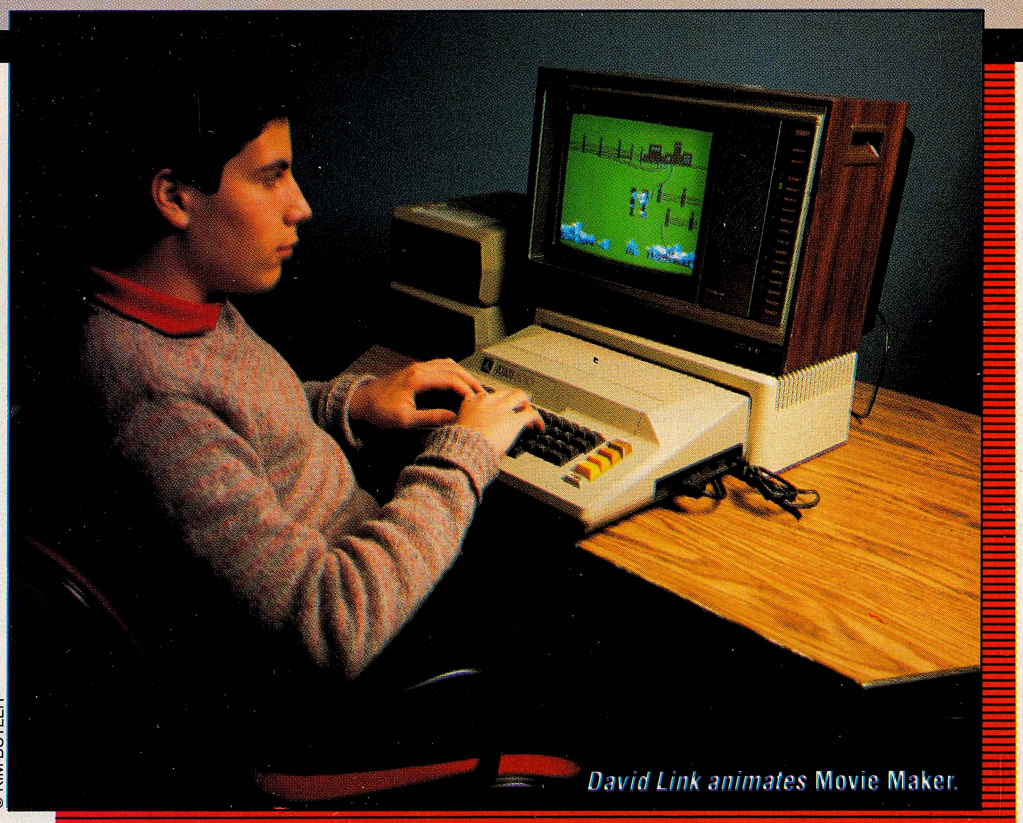
IS IT WORTH THE PRICE?

We both would love to own a PC*jr.* It's great for any home use except word processing (because of the keyboard). But, it really doesn't do anything that an Atari, Commodore, or TRS-80 can't—at least not anything worth hundreds of dollars more. So why would you buy it?

For some people, the IBM name may be worth the extra cost. That name is *not* just a status symbol. What you're paying for when you buy IBM is a guarantee that the company will be around to support the machine, and that every major piece of software that comes out will be available for your use.

You can't go wrong with the PC*jr,* but you should understand what you're paying for. If you're worried about the future of your computer, the IBM "guarantee" may be worth several hundred dollars. But that's something only you can decide.

RICHARD CHEVAT is ENTER's technical editor. BELA SELENDY, 16, is a member of ENTER's Youth Advisory Board.



© KIM BUTLER

David Link animates Movie Maker.

YOU OUGHTA BE IN PIXELS

BY PHIL WISWELL AND DAVID LINK

Did you ever draw pictures on the pages of a pad, then flip through them so that images appear to move? In simple form, that's the way animation works. It's also the way you create animated movies with *Movie Maker,* a software "toolkit" from Interactive Picture Systems (IPS).

You don't use paper and pencil with *Movie Maker.* And, more important, you don't have to write a lot of computer codes to put graphics in motion. There is comparable software for computer animation (see sidebar), but these often require more programming knowledge. With *Movie Maker,* the basics of computer animation can be learned and put to creative use in one day, even by those who have never written a computer program before.

HOW IT WORKS

Movie Maker lets you create a number of still-frame pictures, edit them, place them in sequence and then play them back on the screen. If that was all there was to this software, it wouldn't be anything out of the ordinary. But, *Movie Maker* lets you create six separate characters and a background scene, as well as a soundtrack of music and sound effects. The finished movie can be stored on a blank disk or incorporated into other programs.

We'll warn you: *Movie Maker* is a big tool kit. This software is easy to get into, but will take time to master. To give you an idea of what's possible, IPS has put a demonstration program on the reverse side of the disk.

The first thing you have to do is learn the alphabet. With this software, each key stands for a graphics command. For instance, you type in "B" if you want to change the color of the border, then "C" for color and then a number that represents the color you want. It makes sense and is easy to remember.

Unfortunately, we found *Movie Maker*'s users' manual difficult to

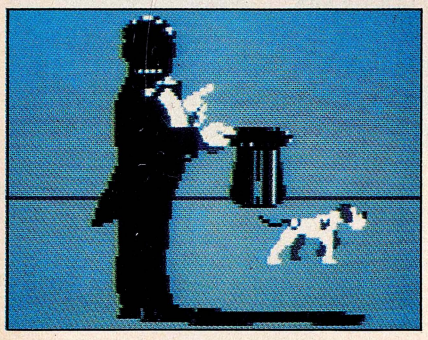
follow. That makes learning commands harder than it should be. We think software—especially software that lets you be creative—should have a better set of instructions.

FOUR FACES OF ANIMATION

Movie Maker is divided into four smaller programs: Compose, Record, Smooth and Play.

The Compose mode lets you start from scratch, or call up one of the disk's pre-programmed figures. These figures include dogs, spaceships and robots.

If you start from scratch, you begin with a blank screen called the shape table. Using simple keyboard commands, you create a figure, then press another key and duplicate this figure across the screen. To create the animation effect, you make slight variations in the position of each figure.



Animated scenes from the demo disk.

There are two ways to use the next mode, Record. You can use a joystick to place images around the screen, or you can hit the space bar to stop the action and change image placement after each frame. The joystick is faster, but the space bar is more precise.

There are also music and sound effects. You have 16 organ notes to compose a musical score, and 16 sound effects, such as thudding footsteps and spinning saucers. Unfortunately, you can't create your own sound effects. We think this would add a lot to *Movie Maker*'s movies.

FINAL NOTES

Movie Maker is a very user-friendly piece of software—even for first-time computer users. The software is structured to keep you from getting lost. You are never more than a keystroke or two away from the main help menu.

The users' manual, however, is user-unfriendly. Once past this, we found *Movie Maker* thoroughly enjoyable. You avoid tedious computer code chores and can spend your time making creative animated stories.

That sure beats flipping the pages of a pad.

Movie Maker, by Interactive Picture Systems, is published by Reston Publishing, Inc. (11480 Sunset Hills Road, Reston, VA 22090.) It is available for the Atari, Apple and Commodore computers and will be available for the IBM by August. Suggested retail price is $60.

PHIL WISWELL is a contributing editor. DAVID LINK, 15, does his animating on an Apple Computer.

ANIMATED SOFTWARE

Here's some other animation software that can put your graphics in motion.

Graphics Magician from Penguin Software (P.O. Box 311, Geneva, IL. 60134) lets you feature as many as 32 objects in an animation program. To get the most from this, you'll need some programming knowledge. Available at $59.95 for Apple and IBM computers.

Available in two sections—the *Picture Painter* program and the *Animator* program—at $39.95 each for Atari and Commodore 64 computers.

Creature Creator from DesignWare (185 Berry St., San Francisco, CA 94107) is a more simple animating tool. You "build" your own monster by putting together different heads, legs and arms. Movement isn't extensive, but you can play games like "Simon Says." Available at $39.95 for Apple, Commodore 64, IBM PC and Atari computers.

The A.G.I.L. Paint Program from Animation Graphics, Inc. (11317 Sunset Hills Rd., Reston, VA 22090) is part of the Animation Graphics Illustrator's Library. It lets you use shapes already on the disk or draw your own. You'll need a disk drive, joystick and color monitor. Available at $35 for the Apple II+ and IIe computers.

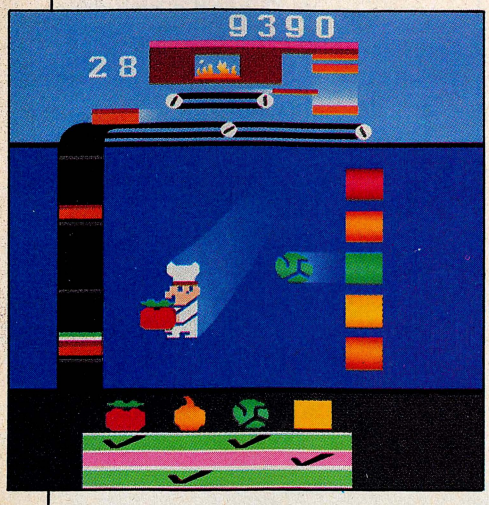
The Graphics Solution from Accent Software, Inc. (3470 Wright Place, Palo Alto, CA 94306) takes time to master but it can help you create your masterpiece. The animation is smooth and you can even mix in text. Available at $149.95 for Apple II, II+, IIe, and IBM computers with 64K.

STEVE, GARRY AND DAN KITCHEN ARE

BROTHERS BY DESIGN

BY JIM LEWIS

Garry, creator of **Pressure Cooker** *(below), knows pressure. He learned to program while studying for an exam.*



A squadron of old-time radios descends upon Keystone Kelly during the hit video game *Keystone Kapers*. To you, these may seem just another madcap obstacle. But to Garry Kitchen, the game's designer, they are very special. These radios, you see, are part of the reason Garry and his brothers, Steve and Dan, are among the country's top video game designers.

The rise of the Kitchen brothers—who have created such Activision games as *Space Shuttle, Pressure Cooker* and *Crackpots*—can be traced back to the 1920s when their father, George, was a boy. In those pre-video game days, George and *his* father used to spend hours around the dining room table building radios and learning about electronics.

George Kitchen made his living as a journalist, but he's never stopped "tinkering with electronics"—collecting and fixing old radios, rebuilding TV sets and creating all kinds of electronic devices from hobby kits.

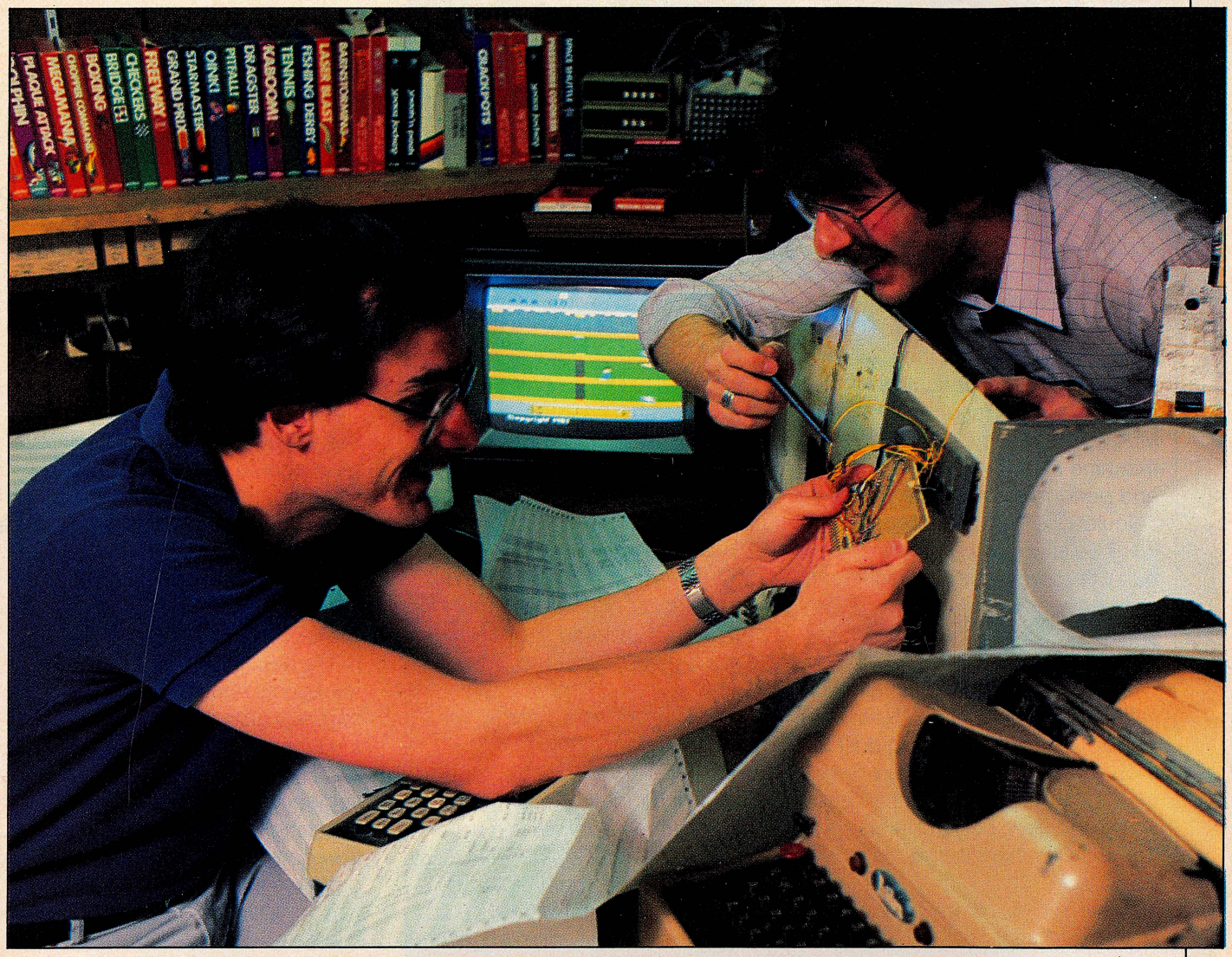
His passion for "taking things apart and figuring out how they work" is something he passed on to each of his sons.

"Dad's the one who got us all started," says Steve, 32, designer of *Space Shuttle*. "He's the inspiration."

INVENTING AT HOME

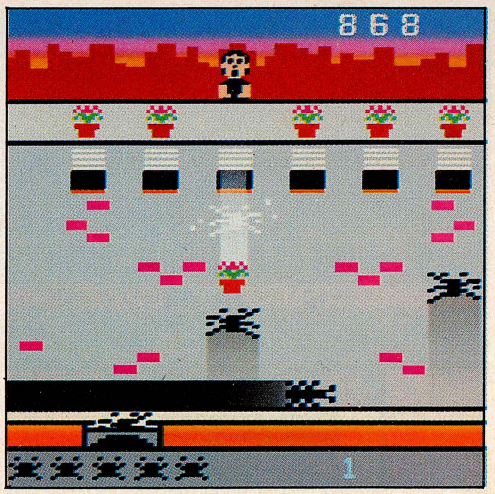
As the oldest Kitchen brother, Steve was first to be introduced to his father's basement electronic workshop. When Steve was about eight years old, his dad gave him a hobby kit to build a crystal radio. Steve quickly mastered this project and was soon looking for another challenge.

A family friend mentioned computers. At that time, back in the early 1960s, computers were enormous, mysterious machines. But this did not bother Steve. When the



friend said Steve couldn't build a computer, the oldest Kitchen brother decided it could be done. He bought some inexpensive boards and circuits at a local electronics store and immediately went to work. "Once I got the bug, I worked on it almost constantly," he recalls.

By putting this machine together without books to guide the way, Steve learned a lot about computers and electronics. "I'd come up with a new circuit or switch and think I had just revolutionized electronics, then



ABOVE: M.A.N.I.A.C., their homemade computer, is a hit with Dan (left) and Garry. LEFT:* Crackpots *was Dan's first game.

© JIM POZARIK

discover the thing I invented already existed," says Steve. "But by building these things from scratch, I learned the insides of a computer in much greater detail than if I had read about it in a book."

Steve worked for a long time on his invention. When the work was done, he had created the Mathematical Alpha Numerical Integrated Analysis Computer—or M.A.N.I.A.C., as he called it. This machine could predict elections and perform all kinds of amazing calculations. But, Steve recalls it had one slight problem: It was too bulky to move out of the basement.

> ***"There's friendly competition, but we're happy when any of our games top the charts."***

THE NEXT WAVE

To this day, M.A.N.I.A.C. remains in the family basement in New Jersey. It just sat collecting dust for a while after Steve left home. But then the younger Kitchen brothers, Garry and Dan, began tinkering with their brother's home-made computer.

"I learned M.A.N.I.A.C. from the inside out," says Dan, 22, youngest of the three and creator of *Crackpots*. "I tried to improve on it and even put in a voice recognition system....Steve had a great influence on me."

Garry, 28, the middle brother, also gained a working knowledge of electronics by puttering with M.A.N.I.A.C. and other projects. But Garry, who recently followed his big hit *Keystone Kapers* with a new game, *Pressure Cooker*, was more interested in another field—art. "That's what I studied," says Garry. But when the time came to get a college degree, he chose engineering.

While still in school, Garry went to work part-time with Steve at an electronics design company. Steve was developing two hand-held electronic games, *Bank Shot* and *Wildfire*, for Parker Brothers. He wanted Garry's help programming ball movement in the games.

"Because he studied art, Garry has a great sense of how the movement should look," says Steve. Unfortunately, Garry was studying for an exam at the same time that he was learning to program.

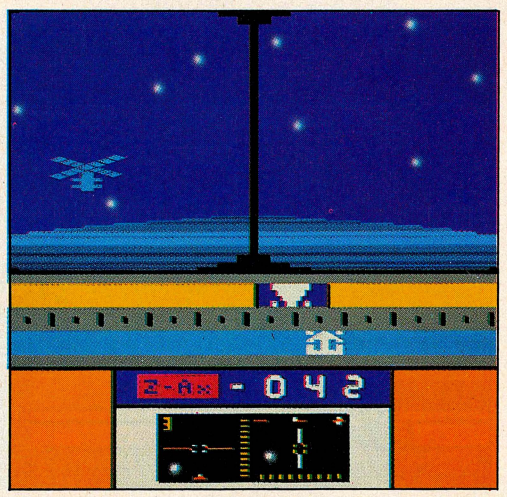
"He taught himself to program... and even passed the exam," says Steve.

The success of these two hand-held games helped launch Garry's career. It also convinced Dan that the time was right to join his brothers. He started as a technician, soldering circuit boards, and watching Steve and Garry create new games. Dan made such quick progress that his brothers bought him an Apple II computer for Christmas in 1980.

"And then I went home and taught myself to program it," says Dan.

BACK TO THE BASEMENT

Gradually, the brothers gained a reputation as top game designers. Steve left New Jersey to try his luck in California. Garry, Dan and some friends decided to start their own independent design group, Imaginative Systems Software. This group got contracts to work for big companies like Coleco, but their offices were tucked away in Garry's basement.



Space Shuttle *(right) is Steve's latest. He started by designing handheld hits like* Wildfire *and* Bank Shot.

In 1982, this group came to the attention of the people at Activision. Garry's new game, *Space Jockey* (for the Atari 2600), was being shown at a big electronics convention. Tom Lopez, Activision's vice president for development, complimented Garry on the game and said he would be in touch.

"I really didn't think he took us seriously," says Garry. But just two months later, Lopez and Activision President James Levy came to visit the basement workshop.

"It was a little embarrassing," recalls Dan. "I remember the water company man came to read the meter in the middle of the meeting—and the meter was behind the desk where we were all sitting."

But Activision—which began as a company in an office that was just as informal—was impressed with the group's work. Activision arranged to move the design group out of Garry's basement into Activision's new east coast design center.

TOGETHER AGAIN

In the past, Garry and Dan had followed in Steve's footsteps. But in late 1982, the situation reversed. The two younger brothers convinced older brother Steve to join Activision.

While the Kitchen brothers are together again, they each work separately. Garry and Dan design their games from the east coast and Steve works in Activision's Mountain View, California, headquarters.

"There's some friendly competition," admits Garry, "but we're always happy to see any of our games hit the top of the charts." The success of such games as Dan's *Crackpots*, Garry's *Pressure Cooker* and Steve's *Space Shuttle* have made the Kitchens a happy clan.

Perhaps the only way these brothers could be much happier would be if their father, George, designed a hit video game.

"I really don't think so," says George.

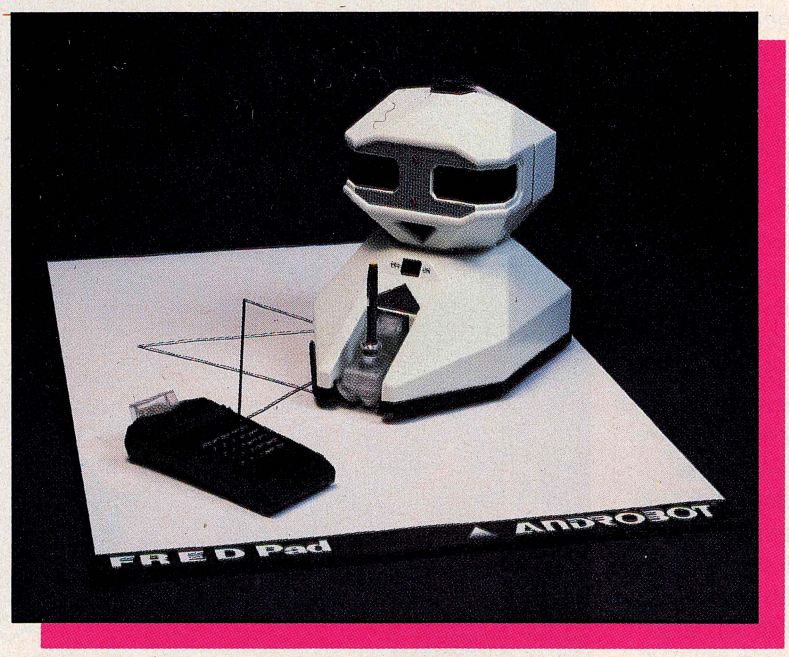
But don't be so sure. In the game-making Kitchen family, you never know what's cooking next.

JIM LEWIS is senior editor of ENTER.

Steve Kitchen has gone from his Dad's basement workshop to a seaside, shuttle-filled design center.

© RICK BROWNE

WIN A ROBOT!



BY MICHAEL DAYTON

Our robot has escaped!

Tell us where he's hiding, and F.R.E.D.—the short, friendly robot from Androbot, Inc.—just might be yours.

F.R.E.D. can be hooked up to a computer, create drawings and demonstrate the basics of robotics. But right now, this roly-poly robot wants to play hide-and-seek. We guarantee you a wild chase.

How can you find F.R.E.D.? It's not easy, but there's a way. If you follow these steps, and you're under 18 years old, and we've received your entry no later than June 20—well then, you might be our winner.

HERE'S WHAT YOU HAVE TO DO

1. *Read each clue.* When you think you've figured out the place we're describing, write down the name. For example, if you think the answer to number six is Alcatraz (it isn't, by the way), then write your answers down on a sheet of paper next to the number of the clue. To win, you have to list all the places we've taken you to, including the place where F.R.E.D. is hiding.

2. Once you've reached number ten, look back over the clues very carefully. We buried lots of hints to lead you to the final answer. If you think you know where the robot is, you should be able to dig up at least 10 hints that point the way.

Make a list of all the hints that you can find and include them with answers to our clues. *In case of a tie, the person able to find the most hints will be declared the winner. Thirty runners-up will receive* ENTER *t-shirts.*

3. Send your solution to: Lost Robot Contest.
ENTER Magazine
P.O. Box 777
Ridgefield, N.J. 07657

F.R.E.D. is provided courtesy of Androbot, Inc.

Karel Capek first coined the word "robot." Your journey starts in his home country of (1) _____. While you're there, rent a hot air balloon from Fogg's Flights of Fancy, Inc.

Each gust of wind carries your balloon farther south and east. After crossing the Mediterranean, bring your balloon down near the (2) _____ Canal in (3) _____. This is a good place to visit if you're interested in robots. Nearly 2,000 years ago, the people who lived here made some of the world's first mechanical devices. At local museums, you'll see animal statues with arms and jaws that move.

Now you've still got a long flight ahead of you. Pack a picnic lunch and head east—almost as far east as you can go. In about a week, with a good tailwind, you should find yourself over in (4) _____, the country that uses more robot workers than any other. Bring your craft into the capital city of (5) _____ and spend the night. But you double-park your balloon and find it has been towed away. So hoof it south until you reach the sea.

Robots don't row rowboats. That's too bad, because you've got a lot of rowing to do. Rent a rowboat from Rick Shaw's Rickety Wrecks. Journey to the center of the Earth—equatorially speaking, that is. On your way, you'll pass over (6) _____, the deepest spot on Earth. It's not exactly 20,000 leagues. But it's still too deep for people to explore. Now don't stop rowing. You've still got a long way to go.

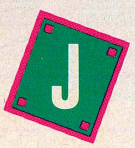
Eastward, ho! You've finally reached the equator. Turn left and don't despair—you've only got 2,500 more miles to row. When you pass the International Date Line, remember to adjust your calendar watch.

Vacation time—and land ho at last. It feels good to have terra firma underfoot again, doesn't it? But what mysterious island can this be? Every day is a holly-day here on (7) _____. And stranger yet—London is only a stone's throw from Paris.

Strolling leisurely from London to Paris, you'll pass Joe's Hill. There, meet a confused rock and roll fan named Pencroft. He sings a strange message that hints where you're headed: "Pink Floyd might have been right, About one sight you can't see at night."

Egads! A bad omen, captain. When you return to London, you find that your boat has drifted away backwards. Of course, we've thought of everything. You'll find (8) _____, the first atomic U.S. submarine, anchored in the lagoon. (The government was kind enough to lend it for this project.) If you've never run a nuclear sub before, don't panic—there's a driver's manual in the glove box and a computerized navigational system that should come in handy.

Look at these rather plain numbers in the driver's manual—305 and 32920. They might not mean much to you at first. But soon, you'll realize that one rings a bell. When you get the first one, the second should be a zip. Those numbers tell you where to pilot your sub. So full steam ahead! We're holding a special flight for you here at (9) _____.



Up, up and away! This sure beats the kneesocks off balloons and rowboats. And just where is this craft cruising to? Only to the fifth-largest sphere of its kind in the solar system. That's right, to (10) _____.

Jumping jackrabbits. Now you're in orbit. Your quest is nearly over, the prize is at hand. The robot pilot is now awaiting your command. "Where do you want to set it down? In which crater do you wish to land?"

It's time to pull all the clues together. If you think about all of the hints we've given you, it won't take long to select the right spot. Just set the ship down in the center of the (11) _____.

enter™

the fun and challenging world of computers

Now from the people who brought you **SESAME STREET, THE ELECTRIC COMPANY,** and **3-2-1 CONTACT** comes **ENTER,** the magazine that is as exciting as computers themselves. There is news about computers, video games and everything from lasers to robots—plus puzzles, board games, quizzes and other features that make learning about computers easy and fun. You won't want to miss an issue. So order your subscription now.

Parents will love **ENTER** too. It'll explain why computers are such an important part of everyone's future.

basic training

PROGRAMS FOR APPLE, T. I., IBM, TRS-80, ATARI AND COMMODORE COMPUTERS

STOP! Don't touch that joystick! Don't bother reaching for another game cartridge. It won't do any good. Your computer will no longer respond to store-bought software. It is now under the control of programs written by a developing terrestrial intelligence—you!

Welcome to the expanded BASIC Training, where every month ENTER will print programs that put you in charge of your computer. On these pages you'll find games, graphics and other programs for the most popular home machines. Many of them were written and sent in by our readers. All of them have been tested by our staff and are ready for you to type in and run. And, the BASIC Training Challenge (see page 55) gives you ideas and hints for writing your own programs—and offers prizes for the best original ones. So get down to BASICs—and have fun doing it.

—Richard Chenal, Technical Editor

THE RIGHT STUFF: ATARI

Do you have the "right stuff" to be a space jockey? This A-OK game program for Atari computers, written by computer programmer Jim Clark, lets you

obstacles to the screen.

NOTE: When you see the symbol (‡) in the program, you should first press the ESC key, then hold down the CTRL key and type the number 2. When you see the symbol ($) press the ESC key, then hold down SHIFT and press CLEAR.

```
10 GRAPHICS 1:POSITION 1,1
20 ?#6;"----dock<>here----"
30 POSITION 1,2
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BASIC TRAINING

PROGRAMS FOR YOUR COMPUTER

Adam, Apple, Atari, Commodore 64 and VIC-20, IBM PC and PCjr, Timex-Sinclair, TI, TRS-80

You are about to ENTER a new DIMension—an expanding and unexplored universe limited only by your imagination. It is a world of REMs and RAM, of GOTOs and RETURNs. Come with us now on a journey through time, space and programming, a journey to...the BASIC Training Zone.

This month, we proudly present the winners of BASIC Training Challenge #2, which asked you to create a video birthday card. The response to the challenges has been great—and you'll be seeing the best answers, along with a new challenge, in every issue from now on. Naturally, we will continue to print programs for all the major home computers, many of them written by you, ENTER's readers.

So remember to tune in every month, same time, same magazine.

—Richard Chevat, Technical Editor

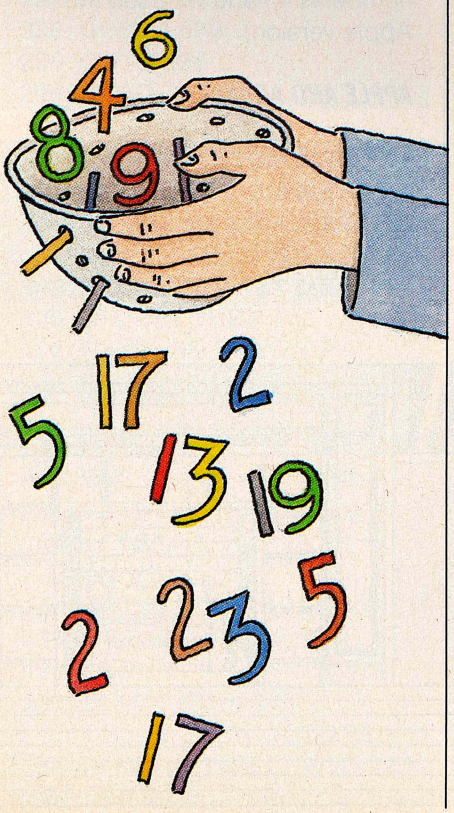
PRIME TIME: ATARI

You've probably heard of prime ministers, prime ribs, and even the Prime Meridian, but what about *prime numbers?* These are numbers which can only be divided evenly by two numbers—themselves and one.

The program below, for Atari computers, demonstrates an ancient method of finding prime numbers. The method is called the "Sieve of Erastothenes," and was named after the ancient Greek mathematician who developed it. The program was written by David Lewis, who is only 19 and whose name is easier to pronounce.

The Atari screen is divided into 800 locations. The program colors in every location that does *not* represent a prime number. It does this by first coloring in all multiples of two, except two itself, then all multiples of three, except three, etc. Even if you're not a mathematician, the process is fun to watch.

```
10  GRAPHICS 3 : REM
    BACKGROUND IS BLACK
20  COLOR 5 : REM
    FOREGROUND IS
    ORANGE-RED
30  ROOT = SQR(799) : REM
    FIND PRIMES
      FROM 0 TO 799
40  PLOT 0,0: PLOT 1,0
50  FOR X = 2 TO ROOT
60  LOCATE X,0,N
65  REM COLOR OF POINT
70  IF N<>0 THEN 160
75  REM IF ALREADY
    ERASED, JUMP TO NEXT
    NUMBER
80  FOR Y = 2*X TO 799 STEP
    X : REM JUMP ALONG
    NON-PRIMES
90  PRINT Y : REM DISPLAY
    NUMBER
100 B = INT (Y/40)
110 A = Y-40*B
115 REM FIND POINT TO BE
    ERASED
120 PLOT A,B : REM ERASE IT
130 SOUND 0,115,10,8
140 SOUND 0,0,0,0
150 NEXT Y
160 NEXT X
```



ILLUSTRATIONS © KURT VARGO

—David Lewis

(BASIC Training continues on next page)

(BASIC Training cont. from previous page)

CODES MASTER: ALL COMPUTERS

%6/BM6/>>
3<32MB=MB63M2=<
93GM 7<M9=<93GMx=<51

The sentence above is:

A) The formula for the space shuttle's rocket fuel

B) A message from an alien life form in the Andromeda galaxy

C) The answer to the last question on next year's SAT

D) A coded message from the ENTER staff.

The correct answer, naturally, is D. Now, are we going to tell you what it means? Of course not. To find out, you're going to have to use the Codes Master program below.

The heart of the program is the loop that begins on line 245. Using the MID$ function in line 260, the program takes your message one character at a time and finds its ASCII value in line 270. *(What's ASCII? See BASIC Glossary, next page.)*

The program then goes to either the coding or decoding subroutine, where it offsets the value of the character by the number (OS) that you have picked. Lines 420, 430, 520, and 530 keep the new ASCII value within the range of the characters the program is using. The program then returns to the loop and prints the new character on line 300.

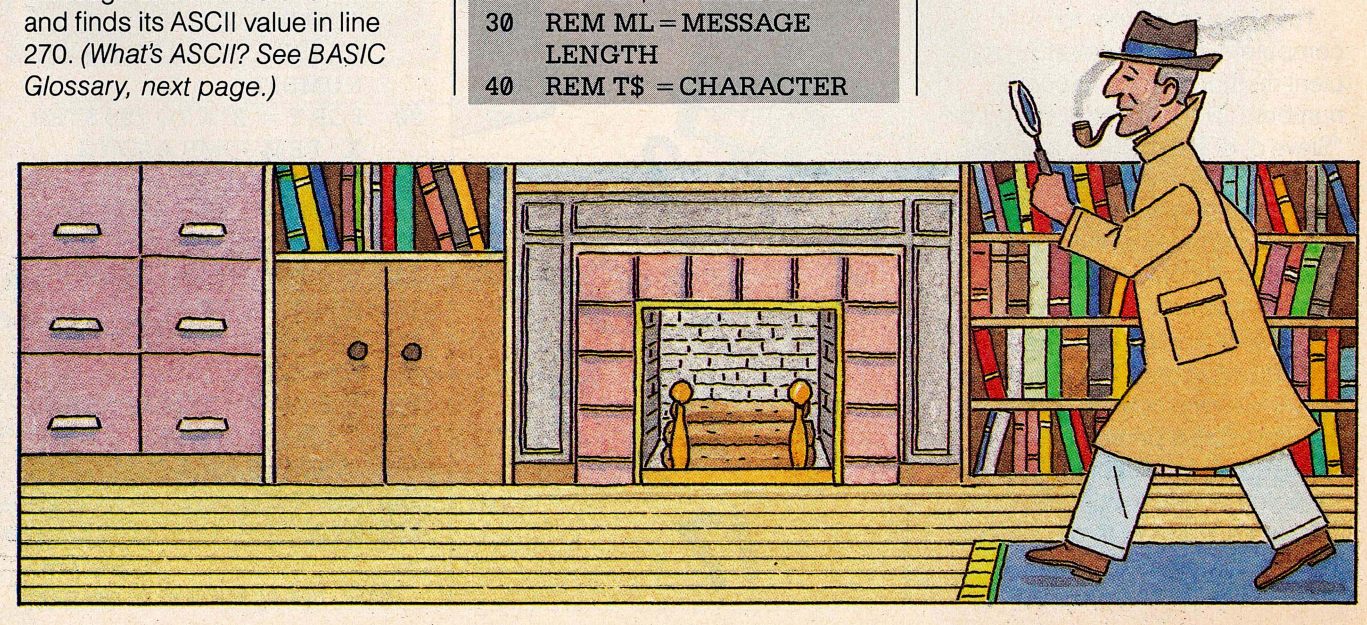
Below is a version of the program for Adam and Apple computers. Following it, you will find easy instructions for adapting the program to Commodore 64 and VIC-20, IBM, Timex-Sinclair, Atari, TRS-80, and TI 99/4A computers.

Once you've typed it in, you'll be ready to decode our secret message. It's a question, and if you know the answer, write in and tell us. (Hint: our secret code number is 45 and we used the Apple version).

APPLE AND ADAM:

```
10  REM CODES MASTER
20  REM M$ = MESSAGE
30  REM ML = MESSAGE
    LENGTH
40  REM T$ = CHARACTER
    BEING OFFSET
45  REM C = VALUE OF
    CHARACTER AFTER
    OFFSET
50  HOME
60  PRINT "WELCOME TO
    CODES MASTER..."
70  PRINT
80  PRINT "WOULD YOU LIKE
    TO..."
90  PRINT
    "ENCODE.....PRESS 1"
100 PRINT
    "DECODE.....PRESS 2"
110 INPUT CH
120 IF NOT (CH = 1 OR CH =
    2) THEN 70
130 HOME
140 PRINT "INPUT YOUR
    SECRET CODE NUMBER"
145 PRINT "INTEGERS ONLY"
150 INPUT OS
160 PRINT "INPUT YOUR
    MESSAGE AND PRESS
    RETURN"
170 INPUT M$
180 HOME
190 IF CH = 2 THEN 220
200 PRINT "HERE IS YOUR
    MESSAGE CODED:"
```

(Program continues on next page)



(Program continued from previous page)

```
210 GOTO 230
220 PRINT "HERE IS YOUR
    MESSAGE DECODED:"
230 PRINT
240 ML = LEN (M$ )
245 REM LOOP TO OFFSET
    CHARACTERS
250 FOR N = 1 TO ML
260 T$ = MID$ (M$ ,N,1)
270 A = ASC (T$ )
280 IF CH = 1 THEN GOSUB
    400
290 IF CH = 2 THEN GOSUB
    500
300 PRINT CHR$ (C);
310 NEXT N
320 PRINT
330 PRINT "PRESS RETURN
    TO CONTINUE"
340 INPUT R$
350 GOTO 10
400 REM CODING
410 C = A + OS
420 IF C < 127 THEN 440
430 C = C - 95: GOTO 420
440 RETURN
500 REM DECODING
510 C = A - OS
520 IF C > 32 THEN 540
530 C = C + 95: GOTO
    520
540 RETURN
```

ATARI: Change the HOME statements in lines **50**, **130** and **180** to **? CHR$(125)**. Delete line **260** and add these lines:

```
5 DIM M$(300)
6 DIM T$(300)
260 T$=M$(N,N)
```

This leaves room for a message of 300 characters. If you want to write longer messages, increase the numbers in the DIM statements.

NOTE: Some of the characters you will get in your code can only be produced using the CONTROL key.

COMMODORE 64 AND VIC-20: Change the HOME statements in lines **50**, **130** and **180** to **PRINT CHR$(147)**.

NOTE: Some of the characters you will get in your code are graphics characters found on the front of the keys.

IMB PC AND PC jr: Change the HOME statements in lines **50**, **130** and **180** to **CLS**.

TI 99/4A: Change the HOME statements in lines **50**, **130** and **180** to **CALL CLEAR**. Change line **260** to: **260 T$=SEG$(M$,N,1)**

If you *don't* have Extended BASIC, then *all* multiple-statement lines must be broken up into single-statement lines; delete lines **120**, **280**, **290**; add these lines:

```
120 IF CH=1 THEN 130
125 IF CH<>2 THEN 70
280 IF CH=1 THEN 290
285 GOSUB 500
286 GOTO 300
290 GOSUB 400
```

TRS-80 COLOR COMPUTER: Change the HOME statements in lines **50**, **130** and **180** to **CLS**.

Delete lines **420**, **430** and **530** and add these lines:

```
420 IF C<91 THEN 440
430 C=C-58:GOTO 420
530 C=C+58:GOTO 520
```

TIMEX SINCLAIR 1000 (w/16K), 1500 AND 2068: Change the HOME statements in lines **50**, **130**, and **180** to **CLS**.

Delete lines **120,190,240,260,270,410,420, 430,510,520,530**, and add these lines:

```
120 IF NOT (CH=1 OR
    CH=2) THEN GOTO 70
190 IF CH=2 THEN GOTO 220
240 LET ML=LEN(M$)
260 LET T$=M$(N)
270 LET A =CODE (T$)
410 LET C=A+OS
420 IF C<64 THEN GOTO 440
430 LET C=C-51
435 GOTO 420
510 LET C=A-OS
520 IF C>11 THEN GOTO 540
530 LET C=C+51
535 GOTO 520
```

—Daniel Cohn

BASIC GLOSSARY

ASCII: The American Standard Code for Information Interchange (ASCII) is a code used by nearly every microcomputer. Its purpose is to make sure that different machines can understand each other, and that similar kinds of programming can be done on all machines.

In ASCII, the numbers 0 to 127 are used to represent letters, numbers and punctuation marks. For example, the capital letter A has an ASCII code of 65.

ASCII codes are usually given in decimal notation (decimal is base 10, the system we usually use), but information inside a computer is stored in the form of *binary* numbers. Binary numbers consist of only 0's and 1's. They are used in computers because 0's and 1's can be represented by a series of electrical impulses that are either on or off.

When you type the letter A into your computer, it is translated into a binary number of 1000001. This series of 0's and 1's represent the same number as decimal 65. Either one is the ASCII code for the letter A.

(BASIC Training continues on next page)

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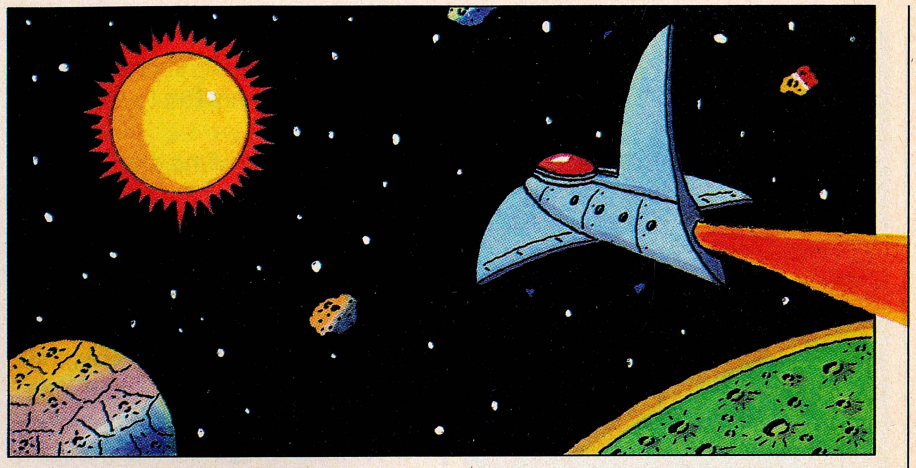
BASIC TRAINING RECOMMENDS

The most logical way to learn how to program your computer is, of course, on your computer. Now there's an outstanding piece of software that lets you do just that. *BASIC Building Blocks,* by the Micro Education Corporation of America, is one of the best hands-on guides we've seen for learning BASIC programming.

Building Blocks is so easy to use that you may never have to open the small instruction booklet that comes with it. Each lesson in *Building Blocks* introduces you to a new skill needed to master BASIC. The text is clear and simple, but it doesn't treat you as if you're still in kindergarten. Even the test questions at the end of each lesson are helpful.

Building Blocks costs $79.95, which is a lot to pay for lessons in BASIC. But, the price includes something called the Basic Design Tool, or BDT. The BDT is a great learning and debugging tool. It allows you to step through any BASIC program one statement at a time. When you run a program with the BDT, it displays each statement before *and* after it is executed. BDT shows you the current status of any variable named in your program, along with other useful information. You can also switch back and forth from the BDT screen to a display of what your program is actually printing.

BASIC Building Blocks is available now on disk for Apple and Atari computers. IBM and Commodore 64 versions will be out in June.



STAR NAVIGATOR: TIMEX-SINCLAIR 1000,1500

You're out in deep space and a new star appears on your navigational screen. Can you plot a course that will keep your ship from being pulled in by the star's gravitational force? You'd better, or you'll be fried crisper than an Arcturean potato chip.

What do you do? Simple! Just load in this handy-dandy Star Navigator program supplied to you by ENTER Magazine. Your computer will ask you your horizontal position (PX) and vertical position (PY) and your velocity or speed (VX). (A negative speed will let you travel from left to right.) The program will then display the results of your choices.

This program was written for ENTER by Michael Allen, a student at Penn State University. It's a game that also teaches you about gravity and acceleration. Acceleration is the amount of change in velocity. The ship's acceleration increases as it gets closer to the star. This is based on the equations in lines 160 and 170, which represent the universal law of gravity. (If you don't believe us, look it up in a physics textbook.)

Try getting your ship to go into orbit, or use the gravitational pull of the star to speed you off in another direction. And even if you get burned up, don't worry. The computer will let you try again.

```
1   REM STAR NAVIGATOR
5   CLS
10  PRINT "ENTER
    HORIZONTAL POSITION
    (0-63)"
20  INPUT PX
30  PRINT "ENTER VERTICAL
    POSITION (0-43)"
40  INPUT PY
50  PRINT "ENTER
    HORIZONTAL VELOCITY"
60  INPUT VX
70  CLS
80  LET VY=0
90  FOR B=1 TO 22
100 PRINT "■■■■■■■■
    ■■■■■■■■■■■■
    ■■■■■■■■■■■■"
110 NEXT B
120 PRINT AT 11, 16; "■"
125 REM POSITION SHIP
130 UNPLOT PX, PY
135 REM FIND DISTANCE TO
    STAR AT 32.5, 20.5
140 LET R=SQR
    ((PX-32.5)*(PX-32.5) +
```

(Program continues on next page)

(Program continued from previous page)

```
    (PY-20.5)*(PY-20.5))
145 REM TOO CLOSE?
150 IF R<3 THEN GOTO 240
155 REM ACCELERATION
160 LET AX=15*(32.5-PX)/
    (R*R*R)
170 LET AY=15*(20.5-PY)/
    (R*R*R)
175 REM NEW VELOCITY
180 LET VX=VX+AX
190 LET VY=VY+AY
195 REM ERASE LAST
    POSITION
200 PLOT PX, PY
205 REM NEW POSITION
210 LET PX=PX+VX
220 LET PY=PY+VY
225 REM OFF SCREEN?
230 IF PX>=0 AND PX<=63
    AND PY>=0 AND PY
    <=43 THEN GOTO 130
235 GOTO 5
240 CLS
245 PRINT "YOU BURNED UP"
250 PRINT "PRESS ENTER TO
    TRY AGAIN"
255 INPUT Y$
260 GOTO 5
```

—Michael Allen

MAGIC SQUARES: APPLE, ADAM

Back in our February issue, our *Pencil Crunchers* column showed you a game called "Magic Squares Tic-Tac-Toe." Now four students from the Saint Gabriel School in Riverdale, New York, have sent us their own computerized Magic Squares program.

The authors of this program, for the Apple and Adam computers, are Giorgio Di Mauro, age 12, Enzo Isaia, 12, Kim Pagan, 13, and Christina Sommer, 13.

In a Magic Square, the numbers are arranged so that each row, each column and each diagonal all add up to the same number—15. Our *Pencil Crunchers* squares only had three numbers per side—as does our programmed square below—but this program can create squares with as many as 17 boxes per side. The only limitation is that each square *must* have an odd number of boxes (3, 5, 7, etc.) per side.

The program follows a formula for creating magic squares that is described in a book called *The Wonders of Magic Squares* by Jim Moran, published by Vintage Books. The formula or *algorithm* is as follows:

Always begin your square by placing the number 1 in the middle box of the top row. Then simply fill in the rest of the boxes with the numbers 2, 3, 4, etc., by following these two rules.

RULE ONE: Place the next number in the box one space up and to the right of the last box you filled. If this causes you to go outside the square, then "wrap-around" to the bottom. (If you go off the square to the right, wrap-around to the left side of the square. And if you go off diagonally from the upper right-hand corner, wrap-around to the lower left-hand corner.)

RULE TWO: If there is already a number in the box you want to insert your next number in, the new number goes directly *below* the previous number. Then continue from there.

See if you can follow the program below through these steps.

```
10  REM MAGIC SQUARES
15  REM N=SIZE OF SQUARE
20  REM  M=TABLE,
    K=COUNTER
25  REM I=ROW,J=COLUMN
30  REM N1=NUMBER TO BE
    PLACED
35  HOME
40  PRINT "ODD NUMBERS
    ONLY"
45  INPUT N
50  PRINT : PRINT
55  DIM M(17,17)
60  K = 1:N1 = 1:I = 1
65  REM FIND FIRST BOX
70  J = (N + 1) / 2
75  REM PLACE NUMBER
80  M(I,J) = N1
90  N1 = N1 + 1
95  REM FILLED SQUARE?
100 IF N1 > N * N THEN 300
105 REM TO KEEP FROM
    PRINTING OVER
    NUMBERS
110 IF K< N THEN 150
120 K = 1:I = I + 1
130 GOTO 80
150 K = K + 1
155 REM NEW COORDINATES
160 I = I - 1
170 J = J + 1
175 REM STILL IN SQUARE?
180 IF I< >0 THEN 200
190 I = N
200 IF J < = N THEN 80
210 J = 1: GOTO 80
300 REM PRINT SQUARE
310 FOR I = 1 TO N
320 FOR J = 1 TO N
330 PRINT M(I,J);"    ";
340 NEXT J
350 PRINT : PRINT : PRINT
360 NEXT I
370 END
```

—Giorgio Di Mauro, Enzo Isaia, Kim Pagan, and Christina Sommer

(BASIC Training continues on next page)

BASIC TRAINING

(BASIC Training cont. from previous page)

CHALLENGE #5: BLAST OFF!

The theme of this month's BASIC Training Challenge is "outer space." There are as many ways to meet this challenge as there are stars in the galaxy. "Star Navigator" in this issue is one example. Or, maybe you're interested in what alien beings would look like (do they have keyboards?). Or how about a program that displays different constellations?

When you have a program that you think is really "far out," send it to us at Challenge #5, ENTER, CTW, 1 Lincoln Plaza, New York, NY 10023. If we print your answer, we'll send you $50 and an ENTER t-shirt.

All programs must be postmarked no later than June 15, 1984. Remember to include a note telling us your age, address, the type of computer your program is written for, and your t-shirt size. Please keep your program under 75 lines.

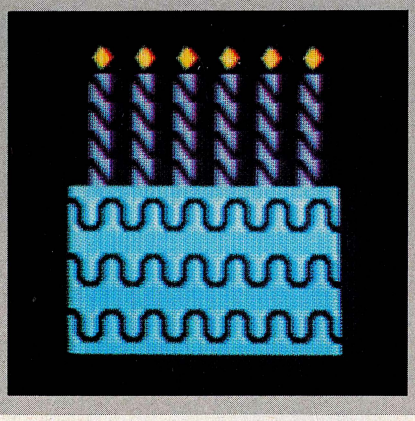
ANSWERS TO CHALLENGE #2: COMMODORE

For our programming Challenge #2, we asked you to create a video birthday card.

Many of you sent in programs that played the happy birthday song or drew birthday cakes. We liked this one, by Nora Shobe, age 12, of Lawrence, Kansas. It not only draws a very colorful cake and candles and plays the song, but it blows the candles out for you (we don't know if the computer makes a wish).

```
10  REM BIRTHDAY SURPRISE
15  REM DRAW CAKE
20  POKE 53281,0
25  PRINT CHR$ (147)
30  FOR C = 55788 TO 55948
    STEP 80
35  FOR S = 1516 TO 1676
    STEP 80
40  FOR X = 1 TO 13 STEP 2
45  POKE C+X,3:POKE
    S+X,201
50  FOR Y = 2 TO 12 STEP 2
55  POKE C+Y,3:POKE
    S+Y,213
60  NEXT:NEXT:NEXT:NEXT
65  FOR C = 55828 TO 55988
    STEP 80
70  FOR S = 1556 TO 1716
    STEP 80
75  FOR X = 1 TO 13 STEP 2
80  POKE C+X,3:POKE
    S+X,202
85  FOR Y = 2 TO 12 STEP 2
90  POKE C+Y,3:POKES+Y,203
95  NEXT:NEXT:NEXT:NEXT
100 REM DRAW CANDLES
105 FOR C = 55629 TO 55749
    STEP 40
110 FOR S = 1357 TO 1477
    STEP 40
115 FOR X = 1 TO 11 STEP 2
120 POKE C+X,4:POKE
    S+X,205
125 NEXT:NEXT:NEXT
130 C = 55589:S = 1317
135 REM LIGHT CANDLES
140 FOR X=1 TO 11 STEP 2
145 POKE C+X,7:POKE
    S+X,90
150 NEXT
155 S=54272
160 REM PLAY SONG
165 FOR R=S TO S+24
170 POKE R,0:NEXT
175 POKE S+24,15:POKE
    S+5,88
180 POKE S+6,89
185 READ H,L
190 IF H<0 GOTO 235
195 POKE S+1,H:POKE S,L
200 POKE S+4,17
205 FOR T=1 TO 400
210 NEXT
215 POKE S+4,16
220 FOR T=1 TO 40
225 NEXT
230 GOTO 185
235 POKE S+24,5
240 POKE S+5,24
241 POKE S+6,40
245 POKE S+4,129
250 POKE S+1,34
255 POKE S,75
260 FOR T=1 TO 200:NEXT
265 POKE S+24,0
270 S=1317
275 FOR X=1 TO 11
280 POKE S+X,32:NEXT
285 PRINT CHR$(19)
290 PRINT TAB(12);"HAPPY
    BIRTHDAY"
295 GOTO 295
500 DATA 9,104,10,143,9,104
505 DATA 12, 143, 11, 218,0,0
510 DATA 9, 104, 10,143, 9, 104
515 DATA 14, 24, 12, 143, 0,0
520 DATA 9,104,18,209,15,210
525 DATA 12,143,11,218,10,143
530 DATA 16,195,15,210,12,143
535 DATA 14,24,12,143,-1,-1
```

—Nora Shobe

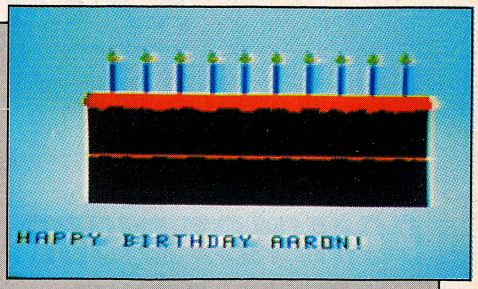


PHOTOS © KIM BUTLER

TI 99/4A

Out of all the birthday cakes we saw, this one was the most colorful. It was created by Bruce Fields, age 13, of Hampton, Virginia.

```
10  REM BIRTHDAY CAKE
20  CALL CLEAR
30  INPUT "WHOSE BIRTHDAY
    IS IT? (ENTER A NAME
    14 CHARACTERS OR
    LESS)" : N$
40  IF LEN (N$)>14 THEN 30
50  CALL COLOR(11,11,1)
60  CALL COLOR(10,6,1)
70  CALL CHAR
    (111,"3838383838383838")
80  CALL CHAR (112,"2010
    38387C7C3810")
90  CALL SCREEN(16)
100 FOR I = 13 TO 16
110 CALL COLOR(I,10,2)
120 NEXT I
130 CALL COLOR(12,10,1)
140 CALL CLEAR
150 LET C=125
160 READ ST$
170 LET C=C+1
180 IF ST$ = "END" THEN 210
190 CALL CHAR(C,ST$)
200 GOTO 160
210 FOR I=8 TO 26 STEP 2
220 CALL HCHAR(9,I,112)
230 CALL VCHAR(10,I,111,2)
240 NEXT I
250 CALL HCHAR(12,6,126)
260 CALL HCHAR(12,28,127)
270 CALL HCHAR(12,7,128,21)
280 FOR I=1 TO 11
290 CALL HCHAR(13,6+I,
    128+I)
300 NEXT I
310 FOR I=1 TO 10
320 CALL HCHAR(13, 17+I,
    140-I)
330 NEXT I
340 CALL HCHAR(14,7,140,21)
350 CALL HCHAR(15,7,140,21)
360 FOR I=1 TO 11
370 CALL HCHAR(16,6+I,
    140+I)
380 NEXT I
390 FOR I=1 TO 10
400 CALL HCHAR(16,17+I,
    152-I)
410 NEXT I
420 CALL HCHAR(17,7,140,21)
430 CALL HCHAR(18,7,140,21)
440 CALL HCHAR(19,7,140,21)
450 LET M$="    HAPPY
    BIRTHDAY" & N$ & "!"
460 FOR I=1 TO LEN(M$)
```

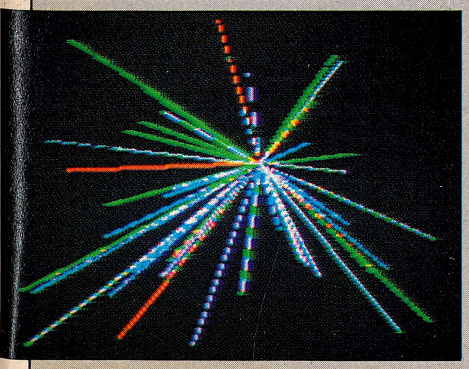



```
470 CALL HCHAR
    (22,I,ASC(SEG$ (M$,I,1)))
480 NEXT I
490 GOTO 490
500 DATA
    "0101010303030301",
    "808080C0C0C0C080",
    "FFFFFFFFFFFFFFFF",
    "FF0F", "8", "FF", "3F03",
    "FEF0", "F"
510 DATA "3F07", "FCF8", "0",
    "FF3F", "C", "",
    "000000FFF8",
    "000000FF3F",
    "000000FF0F",
    "000000FFFC"
520 DATA "000000FF07",
    "000000FFFE",
    "000000FF",
    "000000FFFE",
    "000000FF7F",
    "000000FF1F",
    "000000FFFC", "END"
```

—*Bruce Fields*

APPLE

The writers of this program, for Apple computers, decided that a birthday called for fireworks. The two fiery programmers are John Harding and Scott Moffit, who go to the Episcopal Junior High School in Wichita Falls, Texas.



```
10  REM BIRTHDAY
    FIREWORKS
20  FOR Q = 1 TO 5
30  FOR N = 1 TO 5
40  HGR2
50  H = 90 + 80 * RND (8)
60  A = 45 + 90 * RND (8)
70  FOR Y = 1 TO 200 * RND (8)
80  HUE = INT (7 * RND (8))
90  HCOLOR= HUE
100 B = 280 * RND (8)
110 I = 190 * RND (8)
120 HPLOT H,A TO B,I
130 NEXT Y: NEXT N
140 TEXT : HOME
150 A$ = "HAPPY
    BIRTHDAY....."
160 L = LEN (A$)
170 B$ = A$
180 FOR Z = 1 TO 100
190 A$ = RIGHT$ (A$ ,L - 1) +
    LEFT$ (A$ ,1)
200 B$ = RIGHT$ (B$ ,1) +
    LEFT$ (B$ ,L - 1)
210 VTAB 6: HTAB 20 - L / 2
220 PRINT A$
230 VTAB 12: HTAB 20 - L / 2
240 PRINT B$
250 NEXT Z
260 NEXT Q
```

—*John Harding and Scott Moffit*

STATE OF THE ART

COMPACT DISCS: FULL-SIZED SOUND

BY IVAN BERGER

COURTESY OF N.E.P. CONSUMER ELECTRONICS

It's round and flat, has a hole in the middle, and carries music. But the Compact Disc (CD) doesn't look—or sound—like any record album you've known before.

The CD is a new way to record and play music. It uses a combination of laser and computer technologies to reproduce sounds that are crisper and cleaner than those from a standard LP or tape. And the CD's shiny, one-sided surface is hard to scratch, easy to clean and impossible to wear out.

The CD is smaller than a standard LP, but it can hold up to one and a half times as much music. Only one side—the silver-and-rainbow-colored bottom—carries music. The flip-side is just a label.

Using a CD player is more like using a cassette deck than a phonograph. To play a CD, you just slip in the disc and press the play button. The player's laser reads the disc and relays the information to the speakers, where it is turned into music. (The laser will *not* go on unless the player's lid is closed and a disc is in place. This is because even a low-powered laser like the one used in CD players could injure users' eyes if they were to look directly into it).

The player lets you "arrange" the way the music will be played. You can punch buttons to play only the songs you want, scramble their order, and fast-forward or "rewind" across the disc. Many players even let you hear the music as you skip through the disc—and at correct pitch, not raised to a screech (as it is when you speed up a tape).

HOW COMPACT DISCS WORK

Sounds are vibrations—tiny, rapid changes in air pressure. A microphone turns these vibrations into a fluctuating electrical voltage. Standard recordings make models, or "analogs," of that fluctuation. They do this either as a groove in a record, or as a varying magnetic field on a tape.

On a CD, the music is recorded "digitally" as a spiral train of microscopic bumps. Each "bump" represents a "0" or "1" in a computerized list of numbers. From these numbers, the original sound can be reconstructed.

Here's how it happens. First a tiny computer in the CD player "digitizes" the sound. That's done by sampling it 44,000 times per second and recording the precise voltage of each sample as a digital number. Those numbers can be converted back to a fluctuating voltage which will then make music on a stereo.

Next, the laser underneath the disc focuses on the pits that contain information in binary code. The light bouncing back is read by a photodetector. Then computer circuits in the player unscramble the binary code and produce the sound.

DIGITAL SOUNDS DIFFERENT

"Analog," the older, more common kind of recording, is simpler. But it is limited. In analog recording, subtleties of signal quality get lost each time a recording is made, and noise builds up with each copy.

With digital compact disc recordings, there isn't any gritty, hissy surface noise—the ticks and pops that interfere with music on regular phonograph records. Listen closely, and you'll hear other differences as well: less dis-

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subcode" channels—
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V screen.

CD's may also be used
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disc could hold about
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megabyte, compared
t 200 *dollars* per mega-
urrent computer "hard
tems.

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yond music. It remains
n how quickly that
will become reality.

ER is a freelance writer and the itor of Audio *magazine.*

HOW MUCH THEY COST: The discs cost between $15 and $35. The players range from $600-$1500. However, both disc and player prices are falling. Some players may cost as little as $300 by 1984's end. These prices do not include the cost of amplifiers and speakers, but players can be plugged into any stereo system.

WHERE TO GET THEM: The players are sold by most hi-fi specialty stores and many department stores (including Sears). Large record stores usually carry a wide variety of the discs. So far, about three dozen different kinds of players and 500 disc recordings have been announced. Not all of those are actually available yet.

WHAT'S NEXT?: Within the next two years, there should be CD players for cars. And CDs may someday be used to hold computer information.

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COMPACT DI
FULL-SIZE
SOUND

BY IVAN BERGER

COURTESY OF N.E.P. CONSUMER ELECTRONICS

It's round and flat, has the middle, and carrie music. But the Compa (CD) doesn't look—or so like any record album you known before.

The CD is a new way to and play music. It uses a bination of laser and com technologies to reproduc sounds that are crisper a cleaner than those from a dard LP or tape. And the CD's shiny, one-sided surface is hard to scratch, easy to clean and impossible to wear out.

The CD is smaller than a standard LP, but it can hold up to one and a half times as much music. Only one side—the silver-and-rainbow-colored bottom—carries music. The flip-side is just a label.

Using a CD player is more like using a cassette deck than a phonograph. To play a CD, you just slip in the disc and press the play button. Then you can instantly call up any song you want to hear. You can also program the player to play the songs in any order you like. And you can search for a particular passage in a song. You'll hear the music as you skip through the disc—and at correct pitch, not raised to a screech (as it is when you speed up a tape).

HOW COMPACT DISCS WORK

Sounds are vibrations—tiny, rapid changes in air pressure. A microphone turns these vibrations into a fluctuating electrical voltage. Standard recordings make models, or "analogs," of that fluc-

"Analog," the older, more common kind of recording, is simpler. But it is limited. In analog recording, subtleties of signal quality get lost each time a recording is made, and noise builds up with each copy.

With digital compact disc recordings, there isn't any gritty, hissy surface noise—the ticks and pops that interfere with music on regular phonograph records. Listen closely, and you'll hear other differences as well: less dis-

tortion—fuzziness—even when the sound gets loud. The CD keeps all the low and high frequencies in proper balance. It can reproduce a wider range of volume. It can play sudden musical peaks, like drumbeats, without squashing or crunching them.

And because compact discs are played by scanning them with light, not by dragging a needle over them, CD's don't wear out. Even fingerprints and scratches don't cause as many problems as they do with LPs. The signals are not exposed, but are buried inside the disc, under a transparent layer so deep that most surface dirt and scratches are too far out of focus for the laser beam to detect. And there's less chance you'll scratch the discs, because the players are completely automatic.

DISADVANTAGES

This all sounds great, but there's a catch or two.

Price is the big one: CD players cost from $600 to $1500. The records are expensive, too—about $15 to $35 for a CD, versus $6 to $20 for an LP record.

Some listeners also feel that the CD's sound is *too* crisp, and not as good as the conventional phonograph's. Not all listeners agree, but some think CD recordings sound shrill and unnatural.

In the future, most experts think prices should come down and the sound quality go up. There will even be players that will let you listen to CD's in your car or through headphones while you walk. The players and discs will have new features, too. For instance, "subcode" channels—which now tell the player where songs are on the disc—will soon also hold selection titles, song lyrics, and possibly even still pictures of the performers that play on your TV screen.

Finally, CD's may also be used to hold computer data or programs. A disc could hold about 2,000 megabytes, at a cost well under $1000 for the player and the disc, combined. That's about 50 *cents* per megabyte, compared with about 200 *dollars* per megabyte for current computer "hard disk" systems.

CD opens up possibilities that extend beyond music. It remains to be seen how quickly that potential will become reality.

IVAN BERGER is a freelance writer and the technical editor of Audio *magazine.*

PROGRESS REPORT: COMPACT DISCS

WHAT THEY ARE: Tiny (4 3/4-inch), silvery discs, played by lasers on special players which plug into ordinary stereo systems.

HOW MUCH THEY COST: The discs cost between $15 and $35. The players range from $600-$1500. However, both disc and player prices are falling. Some players may cost as little as $300 by 1984's end. These prices do not include the cost of amplifiers and speakers, but players can be plugged into any stereo system.

WHERE TO GET THEM: The players are sold by most hi-fi specialty stores and many department stores (including Sears). Large record stores usually carry a wide variety of the discs. So far, about three dozen different kinds of players and 500 disc recordings have been announced. Not all of those are actually available yet.

WHAT'S NEXT?: Within the next two years, there should be CD players for cars. And CDs may someday be used to hold computer information.

PENCIL CRUNCHERS

SCRAMBLE #2

BY PHIL WISWELL

In our May issue, we challenged you with our "Compu-talk Scramble." Well, for those of you who just couldn't get enough, here are 14 new words to work on. Can you rearrange the letters in these mixed-up words so that they make sense with the definitions we've given you?

For a little variety, put your unscrambling skills to the test. Try covering up the definitions and working from the scrambles alone. Or, you can test your knowledge of computer terms by covering the word list and trying to figure out the words from the definitions alone. In any case, oogd kucl—that is, good luck!!

(Answers on page 64)

1. **LIFE**	____ ____ ____ ____	A collection of stored data created by the user.
2. **DEN**	____ ____ ____	Command that stops a program.
3. **BOGUS**	____ ____ ____ ____ ____	BASIC command that directs computer to a program subroutine.
4. **BRAINY**	____ ____ ____ ____ ____ ____	The base number system used by home computers.
5. **BUDGE**	____ ____ ____ ____ ____	Find and remove errors.
6. **CUP**	____ ____ ____	Part of the computer where logical decisions are made.
7. **KEEP**	____ ____ ____ ____	Returns the contents of a memory location to the screen.
8. **POLO**	____ ____ ____ ____	A section of program that will repeat itself.
9. **BRAKE**	____ ____ ____ ____ ____	Key used to interrupt a program.
10. **PEACES**	____ ____ ____ ____ ____ ____	Another key used to interrupt a program.
11. **SPOT**	____ ____ ____ ____	BASIC command to halt program.
12. **LACER**	____ ____ ____ ____ ____	Key or command to remove all data from RAM.
13. **SOD**	____ ____ ____	System a computer follows to read information off a disk.
14. **SAILER**	____ ____ ____ ____ ____ ____	One type of input/output transmission.

PENCIL CRUNCHERS

BINARY JUMBLE

BY REBECCA HERMAN

A computer can only understand two things—the numbers zero and one. No matter what you type on the keyboard, the computer quickly translates this into zeros and ones—the numbers that make up the *binary code*. Only then can a computer read the information that you've given it.

We've created our own version of a binary code. Each combination of numbers below represents a letter in the alphabet. For instance, 01000, 00101, 01100, 01100, 01111, means hello.

Using the code, can you figure out the answer to two riddles? For an added challenge, we've jumbled the letters in each word. You'll need to unscramble them to find out the punchline.

(Answers on page 64)

BINARY CODE ALPHABET:			
	F 00110	M 01101	T 11011
	G 00111	N 01110	U 11010
A 00001	H 01000	O 01111	V 11001
B 00010	I 01001	P 10000	W 11000
C 00011	J 01010	Q 11110	X 10111
D 00100	K 01011	R 11101	Y 10110
E 00101	L 01100	S 11100	Z 10101

WHAT DO YOU GET WHEN YOU CROSS A PIRANHA AND A COMPUTER?

____	____	____	____	/	____	____	____	/	____	____	____	____	____
11100	00110	01001	01000	/	01110	00100	00001	/	11100	10000	01000	01001	00011

WHY DID THE HACKER HIT HER COMPUTER?

	____	____	____	____	/	____	____	____	/
SHE WANTED TO:	00001	11011	00010	00101	/	01000	00101	11011	/

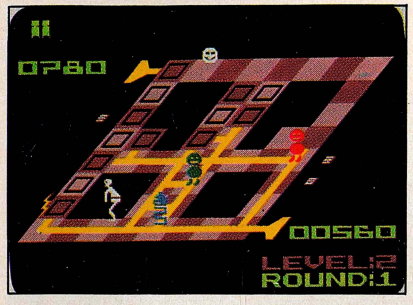
____	____	____	____	____	____
01101	11011	00101	11100	10110	11100

(Continued from page 9)

PHIL: True. But at least this hopping game is not as derivative of *Q*Bert* as most of the others.

JUICE

(Tronix, Commodore 64 disk, $34.95)



This is a very clever adaptation of *Q*Bert* for the Commodore 64. It's not innovative, but it's different enough to be quite enjoyable.

In this game, some of the platforms on the parallelogram have been eliminated. This forms a maze of twists and turns that is a real challenge for players to attempt to negotiate. As you move through the game, the platforms are arranged in different and ever more confounding configurations.

Creatures chase you and there are transportation squares. All just like in *Q*Bert*.

The bonus round is delightful. The player has 30 seconds to uncover a hidden path from the upper left to lower right corners.

There's a lot to recommend in this game, but it's still not our favorite among all the hopping games there are to choose. Still, there's some ingenious game play here. It won't disappoint you.

WRAP-UP

PHIL: For the Commodore 64, I prefer *Pogo Joe*.

BERNIE: I'd rather play *Flip & Flop*.

TO BLAST OR NOT TO BLAST?

In our March 1984 User Views column, "To Blast Or Not To Blast," we asked ENTER readers what they thought of video games that feature violent action—such as shooting aliens, forcing cars off the road or "eating" ghosts in a maze.

Here's what some of your fellow readers had to say. *—Bernie & Phil*

OFF TARGET

I don't like the idea of *Kaboom!* because the "mad bomber" is throwing bombs down at you. I think that that is too violent and that it takes the fun away from games. I would not like to read about games in which animals are the main target. *—Chris Bryant, Iowa City, IA*

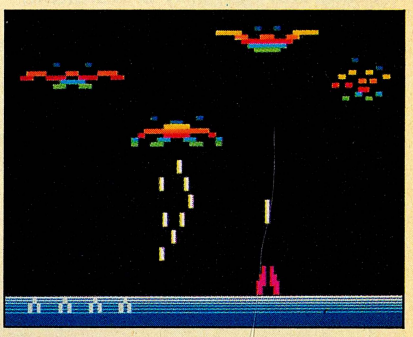
CRAZY CRITIC

Forcing your opponent's car off the road or eating ghosts in a maze does not bother me. It's just a game, and in the game *Demon Attack* the aliens have never appeared to me as birds or any other animals. These things don't take away from my enjoyment of the games. One more thing: I think when the critics start killing video games because of the violence, it's starting to get extremely ridiculous. *—Daron Davis, Buford, GA*

ONLY A GAME

I think you're overreacting, because we see violence on TV all the time. I don't think you should get so uptight about it just because *Demon Attack*'s main goal is killing birds. That doesn't mean I'm going to grow up to be a bird killer, does it?

It doesn't bother me killing birds on a game because that's all it is...a game. *—Angie Mason, Blue Grass, IA*



ON THE MARK

I'm a 12-year-old boy and I've had my good old TRS-80 Model I for four years. I write mostly in Assembler (almost all games) and my friends call me a computer "whiz."

I write only nonviolent games on my computer. In my documentation, I speak out against "shoot everything on the screen" games. I think kids get obsessed with these games and go on to be violent. I think that when you review a violent game, the name of the game should be circled in red, or otherwise marked to show people that the game is violent.

While I'm shooting or eating or whatever, I can feel a kinship with the alien or ghost or robot or whatever. I put myself in his place. I don't like playing violent games.

—Ken Buckley, Pittsburgh, PA

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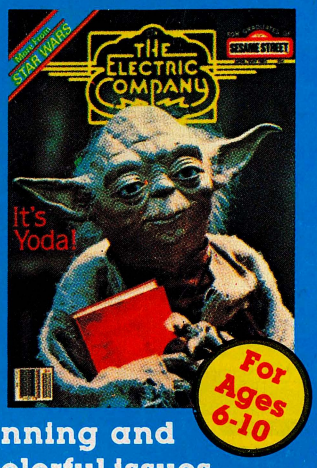

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FEEDBACK

(Continued from page 3)

GOOD SHOW

I'm writing to tell you about the computers we use in Britain. The most popular computer is the ZX Spectrum (48K or 16K). The range of software is incredible—it has the best software in England. We also have: BBC models A and B; Commodore 64; Vic 20; (Sinclair) ZX81, ZX80, and 380Z; Commodore Pet; Apple, Oric; Dragon; Atari 600XL and 800XL and more. In my class, 10 people have 48K Spectrums, one has a 16K Spectrum, two have Apples, two have BBC Model B's, two have ZX81's. The computers we use in school are the Commodores, the 380Z's, Spectrums and ZX81's. I hope you get more of these in America. —Jon Perkins, 13
London, England

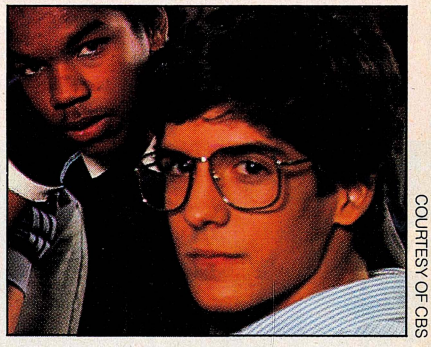
ATARI APPLICANT

I appreciated your article in March 1984's issue entitled "When These Kids Talk, Atari Listens." Your article has persuaded me to write in and apply to be a member. I had no idea this group existed. Thank you.
—Brian Joseph
Fall River, MA

FAN MAIL FOR MATTHEW

Thank you for your article about Matthew Laborteaux and *Whiz Kids.* It is my favorite program.

Could you please give me the



COURTESY OF CBS

address where I can write to Matthew or the rest of the Whiz Kids? —Ken Zick
Riverview, MI

Dear Ken:

We're glad you liked the story. And we're sure Matthew and the rest of the Whiz Kids *cast would love to hear from you, too. You and other ENTER readers can write to them at:* Whiz Kids, *Universal Studios, 100 Universal City Plaza, Universal City, CA 91608. Just address your letter to the actor or actress you want it to reach.* —Ed.

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AD-VICE

I was wondering where I could get a Joyboard and the game *Pipes*. Please name the stores and, if you can, the prices. I have a Vic-20. —Debbie Byrne
Vernon, CT

Dear Debbie:

Both products you mention are sold in Toys R Us department stores. The Joyboard by Amiga costs about $39. Pipes, *by Creative Software, is about $29 for the Vic-20 and $39 for the Commodore 64. The Joyboard is also available through the Spiegel mail order catalogue.*

ZAXXON'S LIVES

The March '84 issue of ENTER is the third one I have received. I read each one from cover to cover. I do all of the "Pencil Crunchers," too. That is why I am writing to you.

Zaxxon is my favorite video game, next to *Dragon's Lair.* In your "Video Crossword" in the March '84 issue, you ask in clue number 21 across what happens if your plane is destroyed three times. The answer turned out to be "ends." From my experience of playing *Zaxxon,* I have found you receive five planes for a quarter, not three.

Who is right?
—Travis Eckenrode
York, PA

Dear Travis:

We both are. The fact is, arcade operators can choose the number of planes you get, depending on how long or short they want game play to run. The Zaxxon *we played on had only three planes. You've been lucky to find a game that gives you five.* —Ed.

FRANKLIN PROGRAMS?

I just got my first issue of ENTER Magazine, and I like it. But why don't you talk about or give programs for Franklin computers—or could I just use Apple programs? —Kevin Ferraro
Bridgewater, NJ

Dear Kevin:

We have good news and bad news. First, the bad news. Because so few of our readers own or have access to Franklin computers, it's not likely we will be running programs solely for the Franklin. But here's the good news. The people at Franklin tell us you can *run the programs written for Apple or Apple II computers (but not the Apple IIe), and get the same results as you would on an Apple. Happy computing!* —Ed.

SYNTH HAPPY

I would like to compliment you on your Dec./Jan. '84 edition. I found the article entitled "What's a Synthesizer?" on page 31. When I showed it to my music teacher, she really liked it. In fact, she ran off enough copies for her other classes. —Kathy Mobley
Clinton, MS

POSTAL PONDERING

I hate to say this, but I have one criticism to make about your otherwise great magazine. Your mailing system is way off, and I don't like it too much. I did not receive my Oct. '83 edition until long after I saw it in most stores. I received my Dec./Jan. '84 issue at the very end of November. I got my Feb. '84 edition the week before Christmas ('83).

If there is a two-month issue, it should be sent during the first month, not at the beginning of the preceding month because there is too much of a wait in between issues. —Kelly Hanink
Northville, MI

Dear Kelly:

As you've probably guessed, double issues create certain mailing complications amidst an otherwise regular schedule. In the future, you can plan on receiving ENTER on or about the 10th of the month preceding the month on the cover.

Our circulation department plans the arrival of your issue to coincide with the delivery of magazines to newsstands, allowing about two weeks in the mail. Of course, there's no way of knowing when the slowdown or speed-up may be due to the postal service.

While all this doesn't improve the delivery date of double issues, you can at least plan on getting your copy of the Jul./Aug. '84 issue around June 16.—Ed.

NEXT

COMING IN OUR JULY/AUGUST ISSUE:

OLYMPICS ON-LINE: Computers have transformed the Summer Olympic Games...ENTER goes behind the scenes to show you how. We take a close look at the U.S. team's computerized training center, talk tech with star athlete Carl Lewis, and review the newest Olympic-inspired computer games.

'THE LAST STARFIGHTER': Find out how a Cray supercomputer created out-of-this-world special effects in this exciting movie about a young arcade game player who becomes an intergalactic hero.

HIGH-TECH HOT SPOTS: From coast-to-coast, there are great places where you can play with new technology. ENTER gives you an in-depth guide to hands-on museums and science centers.

AT HOME WITH TOPO THE ROBOT: What happens when a robot becomes part of the family? Read the experiences of Fred D'Ignazio's family and find out.

PLUS: The latest in movie and music news in *Show Beat.* Hardware and software news in *News Beat.* Young new-tech achievers in *Pacesetters. User Views* on the newest games. And programming for nine computers.

ANSWERS

SCRAMBLE #2 *(page 58)*

1. **FILE**
2. **END**
3. **GOSUB**
4. **BINARY**
5. **DEBUG**
6. **CPU**
7. **PEEK**
8. **LOOP**
9. **BREAK**
10. **ESCAPE**
11. **STOP**
12. **CLEAR**
13. **DOS**
14. **SERIAL**

BINARY JUMBLE *(page 59)*

1. FISH AND CHIPS

2. *SHE WANTED TO* BEAT THE SYSTEM

CORRECTION

Because of a printing error, the answers to the "Game Search" Pencil Cruncher in our May issue (page 46) were left out. The correct answer is printed below.

E C R I T I C A L M A S S N W H
T R E P Y T R E T S A M E A R T
R D I S H A M U S E I W R R O D
A T H F E C O O P N W I P E C N
N M R R S Y P U A O T Z E N K O
S T E A A S E R R Z E A N N Y H
Y S T W A Y O L S E H R T U S C
L N F T E I D R E M C D S R B R
V A I O T K E T C I O R S E O A
A M L B A R A O T T C Y T D O H
N E P O S O D E F L I O A O T P
I I O R N Z L P Y D R I R L S S
A P H L E G I O N N A I R E K L
E E C A P S N I S D U R G T S G
O F S O C C E R X A M E U L B O
R A D R S N O R A B L I O I V E

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